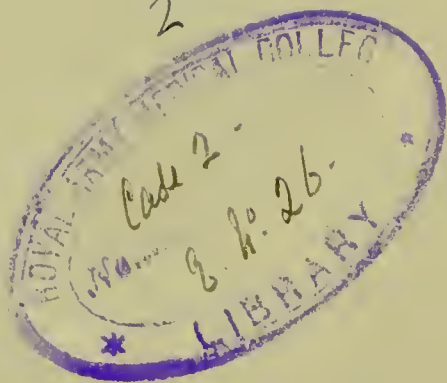


Stricture of the Urethra  
and  
Hypertrophy of the Prostate  
—  
FREYER

TRO  
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To  
Surg General Sir J. Fayer Bart  
KEST F.R.S.

With the kindest regards of

G. French

June 1907

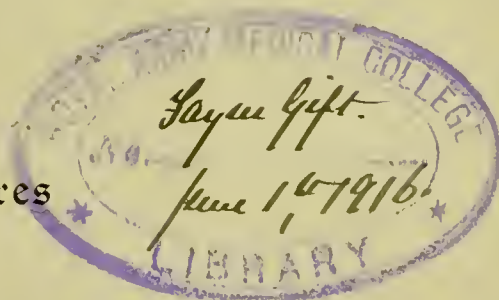
Clinical Lectures

ON

STRICTURE OF THE URETHRA

AND

ENLARGEMENT OF THE PROSTATE





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ON  
STRICTURE OF THE URETHRA  
AND  
ENLARGEMENT OF THE PROSTATE

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## P R E F A C E

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THESE Lectures were delivered at the Medical Graduates' College and Polyclinic in November last, and published in the *Lancet* and *Clinical Journal*. They are now reproduced in the present form at the suggestion of many of those who were present at the Lectures, or who subsequently read them. My aim has been to give a clear, concise, and practical résumé of our present knowledge of the subjects dealt with. The methods of treatment advocated are those which, from personal experience, I have found sound and effective.

46, HARLEY STREET, LONDON, W.

*March, 1901.*





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## LECTURE I.

### STRICTURE OF THE URETHRA: ITS VARIETIES, PATHOLOGY, SYMPTOMS, SECONDARY RESULTS AND DIAGNOSIS.

GENTLEMEN,

I propose directing your attention to-day to stricture of the urethra. It is, perhaps, the most important of the surgical disorders of the genito-urinary organs. It is the most common of those diseases that you are called on to deal with in practice, since at one or other period of life the vast majority of the male population suffers from that condition which most frequently gives rise to it. If neglected or improperly treated, it is most far-reaching in its injurious consequences, through the morbid pathological changes thereby produced.

A detailed description of the anatomy of the urethra would be foreign to the scope of these lectures; but there are certain features in its conformation to which I wish briefly to draw your attention.

The urethra in the adult male is about 8 inches in length. It is commonly divided into three parts—penile, membranous, and prostatic. These two latter, again, constitute the deep, or fixed urethra, in contradistinction to the penile or pendulous urethra. This latter is 6 inches long, the membranous portion being  $\frac{3}{4}$  inch, and the prostatic  $1\frac{1}{4}$  inch. Ultzmann

divides the urethra into 'anterior' and 'posterior,' the triangular ligament being the boundary between them.

It must be remembered that the lengthy urethra in the male, though it acts as a urinary organ, is not essential for this purpose—a tube 1 inch long sufficing for this function in the female. It is, however, necessary for the procreative function—a spermatic conduit, in fact—and is, therefore, essentially a sexual organ.

The urethra may be described as a more or less elastic tube or hose, the inner surfaces of which, in the inactive state, are in contact with each other, being drawn closely together by the muscular and elastic elements in its walls. The surfaces are separated and a true canal temporarily formed during the passage of urine or the emission of semen; and, on the cessation of these functions, the walls close in, the cavity of the urethra being obliterated.

This contractile action of the walls of the canal may readily be demonstrated by the urethroscope. As the metal tube is pushed on the urethral walls are seen to open out, and, on its withdrawal, to contract immediately behind the instrument, the picture presented to the eye being that of a central pit with tiny folds of mucous membrane radiating from it in umbelliferous fashion all round. In the membranous and prostatic portions of the urethra, in addition to the involuntary contraction of the canal, there are certain muscles under voluntary control by which the urethra is still further closed, and by which the last few drops of urine are expelled.

Stricture of the urethra, as its name implies, consists in an abnormal diminution of the calibre of the canal at some particular part; or, as in the quiescent state the urethral walls are in contact and the canal obliterated, perhaps it may be more logically defined as a condition by which the urethra is prevented from dilating to its natural capacity by the force of the urinary stream.

The older writers were in the habit of dividing strictures into three kinds: (1) *Inflammatory*; (2) *spasmodic*; and (3) *organic*.

The former two being of a temporary character, there is a tendency amongst some modern writers, particularly in England, to restrict the term 'stricture' to the third variety, which is of a permanent character. I consider the old classification a convenient one. Any condition of the urethra that causes even temporary retention or obstruction to the flow of urine should not be lightly regarded.

*Inflammatory stricture* consists in a temporary narrowing of the urethral passage from inflammatory swelling of its walls, partially or wholly obstructing the flow of urine for the time being. It may be due to one of the following causes: (1) Acute specific urethritis; (2) injury to the urethra caused by faulty passage of instruments; (3) swelling of the prostate, due to congestion or inflammation of this gland; and (4) it occurs in connection with organic stricture, on which, from various causes, it is often superimposed.

*Spasmodic stricture* is the term applied to temporary contraction of the urethra, due to spasm of the muscular elements in and around its walls. It may manifest its presence in either of two ways, viz., by causing complete retention or diminution of the stream of urine; and by obstructing the passage of instruments into the bladder.

Retention from this cause may occur under the following circumstances: (1) After stretching the sphincter ani preliminary to operations in or about the rectum; (2) following vasectomy or castration; (3) after operations on the kidneys; (4) in connection with catheterization; (5) from injuries to the perineum, the urethra being uninjured; and (6) in patients suffering from organic stricture after exposure to cold and wet, or venereal excesses. Spasmodic contraction, as detected by the passage of an instrument, invariably occurs

in the deep urethra, and is, as a rule, due to reflex irritation of the muscles induced by the presence of an organic stricture of large calibre in the anterior portion of the canal, generally close to the meatus. It is not uncommonly mistaken for organic stricture by the inexperienced surgeon, who fails to discover the real cause, viz., the stricture of wide calibre in the anterior part of the urethra. Reflex spasm impeding the introduction of instruments may also occur when stone or tumour of the bladder is present.

The inflammatory and spasmodic forms of stricture may co-exist, in which case it will be impossible to determine the amount of contraction due to each; and one or both may be superimposed on the organic variety.

The immediate treatment of retention of urine arising from either of these causes is practically the same. It consists in clearing out the lower bowel at once by an enema, placing the patient in a hot bath, and giving opium by the mouth, or morphia hypodermically. Should these measures not suffice, a soft olivary catheter of medium size, 8 or 9 of the English scale, should be passed slowly and gently, or a silver catheter if necessary. If there be any difficulty in introducing the catheter, the patient should be anæsthetized, when the spasmodic element will entirely disappear and the instrument, as a rule, pass readily.

*Organic stricture* may be defined as a permanent diminution in the calibre of the urethra, due to the development of organized lymph or scar tissue in its walls.

The most common cause of this condition is gonorrhœa, and particularly repeated attacks of this disease, followed by persistent and long-continued gleans. In the inflammatory stage plastic lymph is deposited in the mucous and submucous tissues, and may invade the corpus spongiosum. If this lymph is not absorbed, as it generally is, it organizes, and has a tendency to slowly contract, forming indurated masses which



narrow and distort the passage, and fibrous bands which partially or completely encircle the canal. These fibrous bands almost invariably encircle the urethra in its entire circumference. As a rule, they project equally from all aspects of the canal, but are sometimes thinner in one direction than another. The mucous surface may remain entire, but the friction caused by the urinary stream keeps up irritation, and may cause excoriation and ulceration at the seat of stricture, with fresh deposits of plastic lymph.

Injuries of the perineum, such as a kick, blow, or fall astride a fence or railing, are followed by the most intractable form of stricture—the *traumatic*. These causes operate most frequently in the bulbo-membranous junction, the urethra being bruised between the impinging body and the pubic arch.

Other causes of strictures are: cicatrices resulting from chancre at the meatus, or in the first  $\frac{1}{2}$  inch or so of the tube; tuberculous ulcer; urethral abscess; injuries resulting from unskilful catheterization; laceration of the urethra by a calculus in its exit; rupture of a chordee; and the use of strong urethral injections.

The urethra may also be strictured congenitally. This is rare, but I have met with a few instances. I do not refer to congenital narrowing of the meatus, which is not uncommon, but which causes no inconvenience, and assumes no pathological importance unless the patient contract gonorrhœa, or exploration of the urethra or bladder be expedient, when it may be necessary to enlarge the orifice by an incision on its floor.

Stricture is most commonly met with between the ages of twenty-five and forty-five. This is of course due to the fact that gonorrhœa, its chief cause, occurs most frequently during the early years after puberty is reached, and that, as a rule, at least three or four years elapse before the stricture makes itself felt to such an extent that recourse to the surgeon is

found necessary. It may, however, occur at any age as a result of one or other of the causes already indicated. I have seen stricture in children caused by injury of the perineum, and laceration of the urethra due to passage of stone.

There are certain technical terms, which have the sanction of time and general usage, applied to strictures, according to their physical conformation or clinical features. Thus, 'linear' or 'bridle' stricture is the term employed when thin membranous septa or narrow bands extend across the canal and partially occlude it. 'Annular' stricture consists of a narrow band of tissue completely encircling the canal, the contraction being such as would be produced by tying a string round the urethra. 'Ribbon' stricture resembles the latter, except that it is broader. The 'tortuous' variety involves a considerable extent of the urethra, which is irregularly contracted, being narrower at certain points than at others, with the result that the passage through this part of the canal is distorted.

Then, clinically, we have the following varieties: 'Simple,' where the stricture is readily dilatable by instruments; 'resilient,' having a tendency to rapidly recontract; 'irritable,' when painful and liable to bleed on instrumentation; 'indurated,' when the scar tissue is very hard; and 'impassable,' or 'impermeable,' when the surgeon fails to pass an instrument through the opening.

The older English surgical writers, from Sir Everard Home to Sir Henry Thompson, held that stricture was most commonly located at the junction of the bulbous and membranous portions of the urethra. This tenet has in recent years been called in question, particularly by the American surgeons, headed by Otis. The latter considers that he has demonstrated by the urethrometer that stricture is much more common in the penile than in the deep urethra.

This diversity of opinion appears to me to be due to the



different standards adopted as to what constitutes stricture, the American surgeon regarding as stricture any contraction of the canal, no matter how slight—even congenital narrowing of the meatus—provided it gives rise to pathological disturbances from the obstruction and friction caused thereby to the urinary flow. Judged by this standard, it is possible that the anterior portion of the canal may be most frequently affected. But after an experience of many thousands of cases I have no hesitation in saying that pronounced organic stricture requiring instrumental or operative interference is overwhelmingly most common at the bulbo-membranous junction, an experience entirely borne out by an examination of the pathological specimens in the museums.

The proneness to the occurrence of stricture at this situation is attributed to the facility with which discharges lodge in the dilated bulbous portion of the urethra, thus keeping up chronic urethritis with consequent inflammatory thickening or ulceration of the mucous membrane long after gonorrhœa has run its course in the penile portion.

The only kind of stricture known to occur in the prostatic portion of the urethra is the *traumatic*.

Stricture may be single or multiple. The latter is most common. It will be found, as a rule, that a tight stricture in the deep urethra is accompanied by one or more contractions of large calibre in the penile portion of the canal.

### Symptoms of Stricture.

We now come to the symptoms of organic stricture, which are as follows:

1. There is diminution in the size of the stream. This has been coming on gradually for some time, possibly for years, till eventually the stream has become, perhaps, extremely small, or only a few drops of urine may be passed at a time.

2. As a consequence, the patient notices that he spends more time over the act of micturition than he formerly did.

3. The stream is probably forked, flattened, or twisted like a corkscrew. This, however, is a symptom to which too much importance must not be attached, as it may occur in persons free from stricture, owing to some peculiar conformation of the meatus, either congenital or acquired, from thickening of its lips from chronic inflammation.

4. Micturition may be accompanied by a good deal of straining to impel the urine through the narrowed passage, and particularly to get rid of the last few drops.

5. There may be dribbling of urine at the end of micturition, when the penis is allowed to hang down, so that the trousers get wet. This may be due either to atony of the bladder in cases of long standing, with inability to completely empty the viscus, or to inefficient contraction of the accelerator urinæ and compressor urethræ muscles, one of the functions of which is to expel the final drops of urine from the deep portion of the canal.

6. Increased frequency of micturition is one of the earliest symptoms. This may be due to reflex irritation of the neck of the bladder caused by the stricture, or to local cystitis caused by decomposition of the urine that remains in the urethra behind the stricture. In the later stages of the disease this symptom may arise from the fact that, through atony of its muscles, the bladder is never completely emptied of urine, thus reducing its effective capacity in a manner that will be described later on when we come to deal with prostatic enlargement.

7. There is frequently pain, usually of a scalding or burning character, *during* the act of micturition, felt, as a rule, at the seat of the stricture, contrasting with pain felt *after* the act when stone in the bladder exists, and *before* the act when due to prostatic enlargement. When cystitis co-exists there will

be dull, aching pain above the pubes, particularly when the bladder gets at all distended with urine.

8. Gleet discharge is a common accompaniment of stricture, and may be the first symptom that arouses the suspicion of the surgeon as to its existence. In all cases of long-standing gleet the presence of stricture should be suspected and searched for. The mucoid or muco-purulent discharge is due to granular patches or ulceration in the vicinity of the stricture.

9. When this symptom is present, copulation with a healthy female may excite a temporary urethritis resembling a fresh attack of gonorrhœa, for which it may be mistaken, especially after illicit intercourse.

10. There is sometimes a peculiar sensation of a creeping, crawling or fluttering character felt in the urethra when stricture is present.

11. There may be pain of a scalding character in copulation during the emission of semen, and a few drops of blood may pass immediately after the act. In cases of tight stricture there may be no emission of semen, which is forced back into the bladder, and flows away when the penis becomes flaccid, or with the urine in the next act of micturition. Sterility may thus result.

12. There may be nocturnal emissions from reflex irritation. Partial or complete impotency may result from the enervating influence of the disease. And in some few instances excessive desire, or even priapism, may be induced by the reflex irritation of the stricture on the nerve-centre governing the sexual passions.

13. Sudden retention of urine may be the first symptom that attracts attention to the presence of stricture. This is always liable to occur as a result of chill, sexual excess, or errors in eating and drinking, causing congestion of the already narrowed canal, thus temporarily closing it up.

14. A peculiar train of neurotic symptoms is not unfre-

quently noticed ; and, strange to say, these mostly occur in connection with strictures of large calibre. Neuralgic pains in the back and loins, the groins, spermatic cords, testicles, perineum, rectum, and lower limbs occur, frequently giving rise to malaise, nervous irritability, and mental depression—symptoms which disappear when the stricture is successfully dealt with.

With some or all of the above symptoms there will probably be a history of one or more attacks of gonorrhœa some years before, or of an injury to the perineum accompanied by passing of blood from the urethra.

These, then, are the ordinary symptoms of organic stricture. You will rarely find them all present in any particular case. A combination of a certain number of them will lead you to suspect the presence of this disease.

In cases of long standing, however, extensive pathological changes occur in the urinary tract behind the seat of the contraction. These conditions are attended by symptoms that will give an additional clue to the primary cause of the mischief. We will now examine these changes under the heading—

### Secondary Results of Stricture.

There is no part of the urinary tract behind the seat of the stricture that is not liable to be more or less affected by the backward pressure resulting from the obstruction to the flow of urine.

The portion of the urethra immediately behind the stricture is, as a rule, the earliest affected. Here the canal becomes dilated and pouched, with thinned and ulcerated walls.

This part of the canal is never free from the presence of a few drops of urine. This urine eventually decomposes and chronic inflammation is set up, giving rise to muco-purulent discharge. Pasty phosphatic material from the alkaline urine



is deposited here, and may conglomerate into a soft concretion. Or a small urate or oxalate calculus may be arrested at this point, which in a normal urethra would make its way out with the urine.

From the straining efforts of the bladder during micturition the thinned and ulcerated wall may give way, and sudden infiltration of a large quantity of urine take place into the perineal tissues and scrotum, resulting in septicæmia, sloughing of these parts, and death, unless early vent be given to it by free incision.

More frequently, however, a few drops of bacterial urine percolate through a ruptured follicle or fissure into the sub-mucous tissues, giving rise to perineal abscess with resulting urinary fistula.

Congestion of the prostate may supervene, or inflammation of that gland, terminating in abscess, from bacterial infection of its ducts.

The bladder is, however, the organ that suffers most frequently. If it remain free from inflammation, its walls, in the first instance, become thickened from compensatory hypertrophy to overcome the obstruction to the flow of urine; but eventually, under the continued backward pressure and constant straining, it becomes dilated, its walls get thinned, and the mucous membrane bulged out between the muscular fasciculi, pouches being thus formed, the inner aspect of the bladder presenting a honeycombed appearance when viewed through the cystoscope. In the saccules thus formed small calculi passing down from the kidneys may get trapped and grow into large ones.

More frequently, however, urine contained in a bladder that is never completely emptied decomposes from bacterial invasion. Cystitis is thus set up, which may continue for years, giving rise to great thickening of the walls with contraction of the bladder, so that only a small quantity of urine

can be retained. I have opened and drained bladders of this kind on many occasions. The contents have invariably a fearful ammoniacal stench. The walls are covered with thick, ropy, and flaky muco-purulent matter, in which are embedded particles of phosphatic grit, and not unfrequently a phosphatic calculus is formed.

The ureters become dilated and tortuous, with thickened walls.

The pelves of the kidneys dilate in the first instance as a rule, the pyramids get flattened and atrophied, the medulla and cortex compressed and sclerosed, and hydronephrosis may ensue. Eventually pyelitis supervenes, by infection from the bladder through the ureters, the substance of the kidneys is attacked, and suppurative nephritis with numerous pus foci sets in. This is the condition known as 'surgical kidney'—a condition which renders a surgical operation of any kind extremely dangerous, death resulting frequently from suppression of urine due to shock, or from congestion of the kidneys due to the anæsthetic.

Associated with tight stricture of the urethra, hæmorrhoids and prolapse of the bowel are sometimes found, brought on by the constant straining to pass urine. Under conditions of this kind the patient frequently loses control of the sphincter ani, fæces being passed involuntarily during the efforts at micturition.

Epididymitis and orchitis not unfrequently occur in connection with stricture, due to extension of the gleety discharge along the vas deferens, reflex irritation, or instrumentation.

Finally, constitutional symptoms, due to the absorption of toxins from the ulcerated stricture or some secondarily affected part of the urinary tract, may occur in the form of paroxysms of fever, attended by cold, hot, and sweating stages, resembling in many respects an attack of ague. These

paroxysms are particularly liable to occur in persons who have resided in hot climates like India, but they are wanting in the regular periodicity that characterizes malarial fevers, and disappear on the cure of the stricture. This is a matter to which Sir Everard Home called attention nearly a century ago, and from personal observation I can endorse the accuracy of his views.

### Diagnosis by Instrumental Exploration.

Having, then, come to the conclusion that the symptoms, taken as a whole, point to the probable existence of stricture as their cause, we next proceed to complete the diagnosis by instrumental exploration of the urethra.

No matter how strongly the symptoms point in this direction, no definite opinion as to the existence of stricture should be expressed until such an examination has been made, for by this procedure only can a certain diagnosis be established.

But in order that we may be in a position to detect any lesion of the urethral canal, we must first be familiar with its normal capacity. I have, at the opening of this lecture, briefly directed your attention to a few of the physical features of the urethra, but have purposely refrained till now from referring to its calibre.

This rough sketch (Fig. 1) shows the normal calibre of the urethra in the adult male. It is a tracing from the original plate in Sir Everard Home's work, published about a century ago. He injected melted wax into the urethra from the bladder in the cadaver, and on consolidation the wax was, of course, a true cast of the canal. No other method has since been suggested that conveys such a true estimate of the capacity of the urethra throughout its entire course. You will observe that contractions occur at three positions—behind the navicular fossa, at the bulbo-membranous junction, and at the neck of the bladder; and it is at these points that

difficulty is sometimes experienced in introducing an instrument through the normal urethra. This difficulty is avoided by keeping the point of the instrument along the floor at the first-named position and along the roof at the other two.

For exploration of the urethra these olivary gum-elastic bougies (Fig. 2) are undoubtedly the best. They are tipped with olive-shaped bulbs, the stems being many sizes smaller in diameter. Metal instruments of the same pattern, either rigid or soft, are sometimes employed for the same purpose. I prefer the soft, flexible, gum-elastic ones, as less liable to



FIG. 1 (Half-size).

cause pain or do injury, and more calculated to adapt themselves to the natural curves of the urethra.

In passing instruments of any kind through the urethra, the horizontal position is the best. The muscles are more thoroughly relaxed than in the standing posture, and the



FIG. 2.

risk of a fall from the patient suddenly fainting is thus avoided.

If you take a largish instrument—say, 21 or 22 French scale (=12 English)—oiled, and of course previously rendered



aseptic, and introduce it slowly through the normal urethra, you will find that it glides along easily till the membranous portion is reached, the patient being conscious only of a slight sensation of heat or scalding, which is natural, and due to the peculiar sensitiveness of the mucous membrane. At this situation you will be aware of some resistance, and your patient of distinct tenderness, owing to the urethra being narrowed at this point, and to the fact that the canal is here encircled by the compressor urethræ muscle, which holds it, as it were, in its grasp. By gentle, steady, onward pressure, at the same time rendering the penis somewhat tense by drawing it on to the instrument, you will overcome this physiological resistance; and after the bougie has passed the membranous portion, it will glide on easily and without pain through the prostatic portion and enter the bladder, the only sensation felt being a desire to pass urine as the inner orifice is reached. Withdraw the instrument just as slowly and gently as it was inserted, noting again the resistance offered by the membranous urethra to the return passage of the bulb.

In passing instruments of any kind through the urethra there are three cardinal maxims that should always be borne in mind, viz., not to use force, not to give pain, and not to draw blood. The first of these precepts is under our control; it may not be always possible to fully carry out the latter two in practice, for some patients are extremely sensitive, and certain conditions of the urethra are very painful and liable to bleed on the slightest pressure. Nevertheless, these ideals should always be aimed at.

We now pass from the exploration of the normal to that of the strictured urethra. This is conducted in a very similar manner. Commence as before with a large olivary bougie—No. 21 or 22 F.—passing it gently down the canal till you meet with the obstruction. If after gentle pressure continued for a few moments against the face of the stricture, whilst the

stem is held at various angles, the instrument fails to pass, withdraw it; before doing so, however, noticing the position of the stricture, whether in the penile, scrotal or perineal portions of the canal, and measuring its distance from the meatus, the penis being relaxed, not stretched on the bougie.

It is possible that in the progress of the bulb through the canal to the point at which it comes to a dead stop, you may be conscious of the existence of one or more contracted bands through which the bulb just passes, though rather tightly, for in a large proportion of cases having gonorrhœa for their origin the stricture is multiple, a tight stricture in the deep urethra being associated with one or more of large calibre in the anterior portion. These bands will again make their presence felt by the resistance offered to the withdrawal of the bulb.

We next introduce a bougie several sizes smaller—say, No. 16 F. (9 E.)—and ascertain if this will pass readily through the obstruction. If so, we know that there is a stricture at this site in calibre intermediate between 16 and 22 F.; and by trying consecutively larger sizes we soon arrive at its exact capacity.

In withdrawing the bougie when the bulb is obstructed or caught we again measure the distance from the meatus. The difference between this and the previous measurement taken from the anterior surface of the stricture indicates its length. It must be remembered, however, that this is only an approximate measure of the length of the stricture—a measure, in fact, of the pronounced portion of the contraction only; for the urethra is, as a rule, more or less involved for some distance in front and behind this, the strictured passage being irregularly hour-glass in shape.

Should No. 16 fail to pass, we try a considerably smaller bougie—say, No. 12 (6 E.)—and so on, down through the

scale, skipping over several numbers at a time, so as to avoid unnecessary instrumentation.

The peculiar construction of these olivary bougies, which permits of the bulb alone being in intimate contact with the canal or stricture, the narrow stem being quite free in the urethra, their lightness and flexibility, enable us to gauge to a nicety the position, calibre, extent, density and other characteristics of the stricture.

Should we fail to insert even the smallest of these olivary bougies, viz., No. 6 F. (2 E.)—for owing to the disproportion between the bulb and stem they cannot be made of lower grade—we probably have to deal with a very narrow stricture.

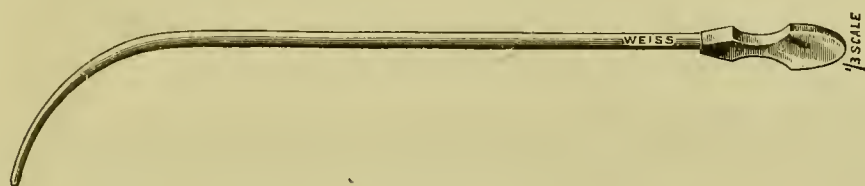


FIG. 3.

I say *probably*, because if the obstruction be met with in the deep urethra, there is a condition sometimes found in this situation, even in the normal canal, which I have already referred to, viz., spasm, which may simulate organic stricture and not yield to these soft instruments.

To ascertain if this condition be present, we select a fairly large solid steel dilator of this kind (Fig. 3)—say, No. 18 F. (10 E.)—and having warmed and oiled it, pass it as far as the obstruction and wait ; no force is to be used ; if the obstruction be due to spasm, the simple weight of the instrument aided by the gentlest pressure will overcome this and carry it through. If it fail to advance, we know for certain that a tight organic stricture is present.

We next bring to our aid these tapering bulbous bougies (Figs. 4, 4A), which, as will appear later on, are the instru-

ments *par excellence* for dilatation of stricture. There are no other instruments that can, as a rule, be so easily inserted through a stricture, but they do not, like the olivary bougies (Fig. 2), convey to the fingers a delicate appreciation of its calibre, extent and density. We select a No. 6 or 7 F. and endeavour to insinuate it through the stricture, employing smaller sizes, if necessary, till we accomplish our object.

For the purpose of measuring the capacity of the urethra, detecting the presence of strictures, and ascertaining their calibre, the urethrameter (Fig. 5) was invented by Otis. It consists of a series of small ribs, which are projected in somewhat umbrella-fashion by means of a screw in the handle, so



FIG. 4.



FIG. 4A.



FIG. 5.

as to form a bulb of varying dimensions at the end, the degree of expansion being indicated by a dial hand. This instrument is particularly useful when the meatus is narrow, for under such circumstances the olivary bougie that passes through this would fail to detect a stricture of larger calibre situated farther on. For instance, suppose a urethra, the general calibre of which is 30 F. with a meatus of only 18, a stricture in this canal of 22 could only be detected by the olivary bougies after performing a preliminary meatotomy, whereas the urethrameter would detect it at once. This instrument was very popular in America some years ago, though it is less

so now. It never came much into use in England. I consider the olivary bougies as efficient for detecting and measuring strictures, besides being simpler and safer, though a preliminary meatotomy may be necessary. The urethrameter is not altogether devoid of danger, for the mucous membrane may be pinched between the ribs in closing the instrument. To obviate this a thin rubber sheath has been introduced, but this renders it so clumsy that only strictures of large calibre can be measured, and not very accurately.

But if we can dispense with its use in the diagnosis of stricture, it is to this instrument, in the hands of the distinguished surgeon who invented it, that we owe a revolution in the surgery of the urethra and bladder, for it was Otis who first demonstrated that the urethra is much more capacious than was previously imagined, thus paving the way for a more rational treatment of stricture, and the introduction of litholapaxy.



## LECTURE II.

### TREATMENT OF STRICTURE BY DILATATION: MANAGEMENT OF COMPLICATED CASES.

HAVING verified the existence of organic stricture by instrumental exploration of the urethra, the next question for consideration is that of treatment.

Our aim, of course, must be to restore the canal to its normal capacity and maintain it in that condition. Many methods of treatment having this object in view have from time to time been introduced, some of them with merely a transient popularity. I shall only deal in detail with those that at the present time are regarded as of established value, of which there are five :

1. Dilatation by interrupted instrumentation.
2. Dilatation by continuous instrumentation.
3. Internal urethrotomy.
4. External urethrotomy.
5. Urethrectomy.

Now, one is frequently asked the question, What is the best method of treatment for stricture? The reply, of course, is that there is no particular method suitable to all cases. The different methods are not to be regarded as rivals. They are supplementary to each other, each having a useful sphere of its own, appropriate to particular varieties of the disease.

Dilatation, whether 'interrupted' or 'continuous,' is undoubtedly the simplest and best mode of treatment for the

great majority of strictures. It should almost invariably be attempted in the first instance, and only abandoned in favour of operative methods when, owing to certain difficulties or complications that may arise, it may be found inefficient or impracticable. It has the further advantage that it in no way militates against the employment of operative interference should such subsequently be found necessary. On the contrary, partial dilatation facilitates operation, for some varieties of which it is absolutely essential.

### Interrupted Dilatation.

Dilatation by interrupted instrumentation consists in the introduction of instruments of gradually increasing size at stated intervals till the stricture is enlarged to the normal calibre of the urethra.

It is suitable for all cases of recent formation, whilst the organized lymph is more or less plastic, and not converted into dense fibrous tissue. Strictures situated in the bulbous portion of the urethra are, as a rule, amenable to this form of treatment, whether single or associated with one or more of large calibre in the penile portion.

This method of treatment has the great advantage that the patient can pursue his usual avocations during its employment.

For this form of dilatation flexible, tapering bulbous bougies (Figs. 4, 4A) are employed in the early stages. Rather stiffish instruments should be selected, for they can be rendered quite soft by immersion in warm water. The very soft varieties become so extremely limp after a short time in use that they are worthless for passing through strictures. There is, as already stated, no other instrument that can, as a rule, be so safely and easily introduced through the urethra. Somewhat similar bougies are constructed with conical

tapering ends (Fig. 6). These should be avoided, for the sharp points are liable to get engaged in lacunæ and false passages, to obviate which the bulbous termination was devised.

Bougies, and, indeed, urethral instruments in general, are constructed according to two different scales—the French (or Charrière) and English. The French instruments increase in size by a millimètre in circumference, the number of the instrument indicating its circumference in millimètres, and they range from 1 to 30, or even higher. The ordinary range in England is from 1 to 12, though they are now made specially much larger. The measurements are arbitrary, and do not follow any scientific rule as in France. Indeed, there



FIG. 6.

is no uniform scale adopted in this country, the gauge of one maker differing slightly from that of another. The French scale possesses the following advantages: (1) It is scientific and exact, so that if any particular instrument, say No. 10, is admitted through a stricture, we know at once that the calibre of the stricture is 10 millimètres in circumference. (2) The range is much more extensive than the English, commencing with much finer and ending with much larger instruments. (3) The augmentation is much more gradual, the increment in size between any two consecutive numbers being much less. Thus, the English numbers 1 to 12 extend over the French numbers 3 to 21.

### Method of effecting Interrupted Dilatation.

Having at the first interview ascertained the calibre of the stricture by means of the olivary bougies (Fig. 2), we introduce consecutively one, two, or three of the tapering bulbous



bougies (Figs. 4, 4A) till we arrive at that size, say 7 F., that just fills the stricture, passing easily, however, without the use of any force. The instrument is withdrawn, and the patient directed to return at intervals of two or three days. At the second interview we begin with No. 6, and follow this by 7, 8; on the third occasion pass 7, 8, 9; and so on, always beginning with a bougie one size smaller than the largest introduced on the previous occasion, and advancing to one or two sizes beyond it, as may be desirable, no stretching of the stricture, however, being permissible.

The instruments are withdrawn at once slowly. No advantage is gained by leaving them in the stricture for a few minutes; on the contrary, spasm, irritation, and even inflammation, may be set up. It is only after an instrument has remained in for several hours, as in continuous dilatation, that spasm subsides, as will appear later on.

Having gradually dilated the stricture up to 18 or 19 (10 E.) by means of these flexible bulbous bougies, we lay them aside, and continue the process by means of the highly polished conical steel dilators (Fig. 3). The flexible bulbous bougies in the smaller numbers are soft and pliant, and adapt themselves easily to the contour of the urethra. The larger numbers are, however, rather stiff and clumsy, so that their points, which beyond the stricture are out of control, are liable to impinge against the floor of the prostatic urethra, cause pain, and sometimes be arrested there; whereas these large blunt steel dilators can be guided easily through the canal, and they possess a dilating power which does not appertain to the soft instrument.

The dilatation by these steel instruments must be continued till 15 or 16 of the English scale is reached, not 11 or 12, as is laid down in the English textbooks, for Otis has shown that the urethra is much more capacious than was formerly imagined. Whatever method of treatment be

adopted, whether dilatation or operation, we must not rest satisfied till the urethral canal is brought up to its normal capacity : otherwise the stricture is bound to recur.

When the stricture has been dilated to the normal capacity of the canal, full-sized instruments must be introduced at increasingly distant intervals—first weekly, then fortnightly, monthly, quarterly—as the case may require, to ascertain that there is no recontraction ; or if there be such, to keep the stricture dilated.

### Dilatation Rationally Explained.

Let us now inquire into the principles involved in interrupted dilatation of stricture. There are two distinct processes going on concurrently during the enlargement that takes place. Firstly, the successive introductions of several instruments of gradually increasing size effect a true expansion of the morbid tissues. Secondly, there is absorption of these tissues taking place at the same time. And in proportion as the latter process predominates will the good results be lasting. The simple contact of an instrument with the morbid tissues of a recent stricture, without the employment of any undue pressure, induces softening and absorption of that tissue. In proof of this the following facts may be advanced : (1) If a small instrument that just passes through a stricture, exerting no pressure thereon, be tied in for several days, the stricture will have enlarged to such an extent that the instrument lies quite loosely therein, and one several sizes larger can be introduced with facility. (2) In many cases of so-called 'impassable' stricture, if an instrument be introduced as far as the face of the stricture, and held against or in its orifice for some hours, the morbid tissues will be modified to such an extent that a filiform bougie will pass readily into the bladder.

How the softening and absorption of the morbid tissues are

brought about it is impossible to say definitely. It is presumed they are due to alteration in the nutrition of the tissues caused by an increased vascular supply induced by the contact of the instruments. However this may be, the fact remains that the simple contact of an instrument with the morbid tissues of a stricture renders them soft and easily dilatable, and at the same time induces absorption, and that these results are independent of any mechanical pressure.

On no account, therefore, should force be employed in passing an instrument for the purpose of interrupted dilatation. Not alone is it unnecessary: it is mischievous, and may be attended by danger. It causes splitting and laceration of the stricture, which renders the urethra intolerant of instrumentation. It may be attended by untoward results, such as ulcer, abscess, urinary infiltration, fever and retention of urine, and is invariably followed by recontraction of a more unmanageable type.

If a stricture is not dilatable without the employment of force in introducing instruments it is not a case suitable for this mode of treatment, and must be relegated to a cutting operation.

I have dwelt somewhat at length on the principles that underlie the cure of stricture by interrupted dilatation, because, though well recognised in France, they are scarcely understood in this country, where the process of dilatation is attributed to the mechanical pressure alone of the instruments employed.

### Continuous Dilatation.

We now pass on to the consideration of ‘continuous dilatation,’ which consists in introducing an instrument through the stricture, securing it in this position, and replacing it by a succession of others of gradually increasing dimensions at

intervals of one, two or three days, till the normal calibre of the urethra is reached.

As the instrument remains constantly in the urethra, *catheters*—not bougies—must be employed for this purpose, in order that the urine may flow thereby; and these catheters should be soft and flexible, so that they may accommodate themselves to the contour of the canal and obviate pain. Later on we shall see that in cases of very tight stricture, however, where difficulty has been experienced in introducing even a filiform bougie, or perhaps a fine metal catheter, the instrument should not be withdrawn, but left *in situ* for a day or two, urine passing beside the bougie, till sufficient dilatation has taken place to permit of a small soft catheter being introduced and tied in.

For the purpose of continuous dilatation cylindrical gum-



FIG. 7.

elastic catheters (Fig. 7) are best, owing to the eye being placed close to the end of the instrument, so that the urine can flow without any considerable portion lying in the bladder, as would be the case were tapering bulbous catheters, in which the eye is necessarily situated about  $1\frac{1}{2}$  inches from the point, employed.

The patient must, of course, remain in bed or lying on a sofa during the progress of this mode of treatment, which generally lasts about a fortnight.

The following is the most practical method of securing the catheter in the urethra: The instrument is passed as far as the neck of the bladder till the urine begins to flow. A spigot of wood is then placed in the end of the catheter. Two pieces of thick, soft cotton cord 10 or 12 inches long are tied at their middle round the catheter, at a point 1 inch from the end of the penis. The four ends are then spread out at equal



distances along the penis, and secured in this position by a strip of adhesive plaster  $\frac{3}{4}$  inch wide wound round the organ, some of the hair of the pubes being included to prevent the plaster from slipping. The catheter should then be withdrawn slightly, so as to render the cords taut, and allowed to remain in that position till the patient desires to pass urine, when the spigot should be withdrawn and the instrument passed on just so far as to permit the urine to flow. The spigot is replaced and the catheter withdrawn as far as the cords will permit. By this arrangement the end of the catheter is never in the bladder except during the act of micturition, and irritation leading to cystitis is thus obviated.

The catheter should invariably be a size smaller than the stricture can admit; that is, it should fit quite loosely. Otherwise, if it fit tightly, the pain and irritation set up will render the treatment unbearable.

After the catheter has been tied in for some hours there will be a free flow of muco-pus from the urethra, due to softening down of the morbid tissues from contact of the instrument. Each time the catheter is replaced the anterior urethra should be syringed out with a weak solution (1 in 6,000) of perchloride of mercury.

Continuous dilatation is employed under the following conditions :

1. When we fail to make progress with 'interrupted dilatation.'
2. When speedy relief is required owing to the occupation of the patient.
3. When, owing to cystitis existing as a complication, continuous drainage through a catheter is required.
4. When, through age or debility, and particularly when disease of the kidneys is known or suspected to exist, an operation is inadmissible.
5. In tight strictures, and such as involve difficulty in

introducing instruments, it will almost invariably be necessary to commence treatment by continuous dilatation, and when sufficient progress has been made to permit of the easy introduction of bougies, to continue the treatment by 'interrupted' dilatation.

6. As will appear later on, continuous dilatation has almost invariably to be employed as a preliminary to internal urethrotomy.

In most cases, as soon as we have dilated a stricture up to 16 or 17 F. (9 E.) by the 'continuous' method, the treatment should be completed by the passage of large steel dilators by the 'interrupted' method. Thus it will be seen that these two modes of dilatation are frequently supplementary to each other.

During 'continuous,' as in 'interrupted' dilatation, it not unfrequently happens that febrile disturbances accompanied by rigors supervene, which may necessitate the temporary or complete abandonment of this method of treatment. But its great drawback is the rapidity with which recontraction takes place, even when an instrument is passed periodically with a view to maintaining the calibre of the urethra.

### The Treatment of Tight and Complicated Strictures.

In describing the treatment of stricture by dilatation I have assumed that we were able to pass a fine, tapering olivary bougie in the first instance with comparative ease. It may happen, however, owing to the extreme narrowness of the stricture, or its being complicated by the existence of false passages, or from other causes, that we may fail to pass one of these bougies.

We then have recourse to these fine filiform gum-elastic bougies of various shapes (Fig. 8), some tipped with tiny bulbs, others rather sharply pointed. We also employ these catgut cylindrical bougies (Fig. 9), some of them of extreme

fineness. Sometimes you will succeed with one variety, sometimes with another.

They are also made of whalebone. I believe these were first introduced into America by Dr. Bangs. I merely mention them here to warn you against their employment. I have completely discarded stiff filiform bougies from my practice, regarding them as dangerous weapons, more calculated to puncture the mucous membrane and produce false passages than to get through the strictured canal.

In the endeavour to pass these filiform bougies through a

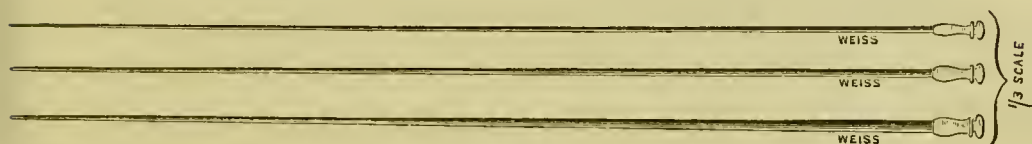


FIG. 8.

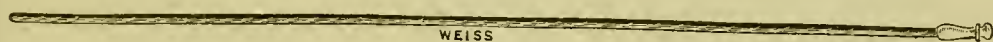


FIG. 9.



FIG. 10.

tight stricture, a good deal of manipulation and manœuvring will frequently be necessary, and your patience will often be put severely to the test.

Render the bougie quite straight in the first instance, and introduce it as far as the stricture, the face of which is then searched by alternately advancing and withdrawing the tip of the instrument, endeavouring to engage it in the opening of the stricture, and then, by gentle pressure and perhaps rotation, to push it through the narrow passage.

Should you fail in your efforts to do this, withdraw the bougie, and substitute one with the end bent at an obtuse angle to the stem (Fig. 10). To obtain the bend plunge the bougie into warm water, give it the necessary angle, and then plunge it into cold water, when it retains its new shape.

With this bent bougie institute a methodical search for the opening all round the outer rim of the obstruction, for the orifice of the stricture, instead of being centrally placed, may lie at the outer margin.

These filiform bougies are also made bayonet-shaped (Fig. 11), and employed in the manner just described.

Having succeeded in passing a fine instrument of any kind through a tight stricture, it should not be removed, but tied in, and continuous dilatation had recourse to in the first instance.

The employment of filiform bougies with tendril or corkscrew terminations (Fig. 12) will sometimes be found advan-



FIG. 11.



FIG. 12.

tageous in overcoming the difficulties connected with the passage of these very tight strictures.

The introduction of an instrument through a narrow stricture will always be facilitated by injecting warm oil into the urethra, so as to distend it. Some of the oil passes back through the narrow passage, lubricating its sides and possibly dilating it slightly, thus rendering the introduction of the bougie easier. Do not allow the oil to escape, but, pinching the end of the penis between the thumb and forefinger of the left hand, introduce the bougie, endeavouring to manipulate it through the stricture whilst the urethral walls are distended by the oil.

One of the most serious difficulties that we may have to contend with when dealing with a stricture, whether tight or otherwise, is the existence of what is called a 'false passage.' A false passage results from a wound of the urethra produced



during unskilful attempts to introduce an instrument, whether by a surgeon or by the patient himself. As a rule, the opening into a false passage is situated on the floor of the urethra, and is most commonly found in the bulbous portion. This is due to the fact that the canal is here naturally dilated and somewhat pouched downwards, before it rather suddenly contracts to form the membranous portion, so that a natural barrier is thus formed, against which the point of a stiff instrument is liable to impinge, and, if unskilfully guided onwards, or force be used, to be driven through the tissues, which are in this situation loose and delicate, and so out of the canal. Imagining that the point of the instrument is still in the urethra, the surgeon may push it onwards so as to again enter the canal behind the stricture, or it may travel backwards between the prostate and the rectum, and perforate the latter, or even the bladder. With rest and proper treatment such a wound may heal so that no trace of its existence be left; but in a large proportion of cases a small pocket or even canal running for a considerable distance will remain — a pitfall for the unwary or sometimes even the skilful surgeon.

Now, how are we to deal with a complication of this kind? We must avoid the aspect of the urethra on which the opening into the false passage exists—that is to say, we must, as a rule, guide the point of the instrument along the roof of the urethra. I fear the soft instruments, of which I am such a warm advocate in most cases, must be laid aside as not suitable to help us out of our difficulty. We must employ a rigid instrument, over the distal point of which we have control, and that rigid instrument will, as a rule, be a metal catheter, so that we may be definitely certain that it has reached the bladder, as indicated by the issue of urine through it, and not merely entered the false passage. When we have succeeded in manipulating a small catheter of this kind

(Fig. 13), through what we conceive to be the stricture, the forefinger of the left hand should be inserted into the rectum to ascertain if the instrument is really in the urethra, in which case you will feel the thickness of the prostate intervening ; whereas, if in a false passage, the catheter will be felt more distinctly, only the thin coats of the bowel lying between it and the finger, and it will probably be out of the middle line. If the catheter should be felt in the false passage, it should be withdrawn an inch or two, and again passed on, keeping its point close along the upper aspect of the urethra, and endeavouring by successive attempts to enter the stricture. You will recognise when the instrument has entered the bladder by your being able to rotate the point freely from side to side, and, of course, by the exit of urine if a catheter is used. Having succeeded in introducing a catheter, it should be tied in, for the case must be treated by continuous dilatation, at any rate till we have advanced to such a degree that an instrument of considerable size can be passed with facility. Cylindrical gum-elastic catheters (Fig. 7), armed with stylets, may also be employed instead of the metal instruments. They are superior to the metal catheters for tying in the bladder, but being less rigid and highly polished they are not so easily guided in.

Another expedient that is sometimes had recourse to in cases of this kind is that of passing a bougie, engaging it in the false passage, and leaving it *in situ*. Another instrument is then introduced, the true orifice of the stricture is searched for and entered. Theoretically this procedure would appear sound and easy of execution ; but in practice I cannot say that I have found it very efficient.

The urethroscope is of great aid in these cases of tight stricture complicated by a false passage. Introduce the largest tube that the urethra will admit, and after some manipulation you will bring the true orifice of the stricture

into view by means of the reflected electric light. A fine bougie is then passed, engaged in the opening, and held there whilst the tube is withdrawn, and then coaxed through the stricture if possible.

Your first interview with a patient supposed to be suffering from stricture will generally be in your consulting-room, or at the out-patient department of your hospital. Having diagnosed the existence of stricture, you will endeavour to pass an instrument of some kind through it. But you may discover that it is so tight, or otherwise complicated, that after several trials you find it impossible to introduce even a small filiform bougie as far as the bladder. You will, naturally, be disappointed, for, apart from the fact that no surgeon relishes being thwarted in his attempts to pass an instrument through the urethra, there is no doubt that the successful introduction of a bougie without pain through a difficult stricture at once commands the confidence of the patient. Do not, however, prolong the séance unnecessarily by persistent futile attempts to insert an instrument. Send the patient to bed, administer a brisk purgative, place him on light diet with absence of all stimulants, let him drink freely of demulcent fluids, such as barley-water, and give him an alkaline mixture combined with hyoseyamus, to remove acidity of the urine and allay spasm. If, after a day or two, you repeat your attempts at the introduction of an instrument, you will in all probability find that you will be successful. A loaded bowel and muscular tension due to walking exercise are calculated to produce congestion and spasm at the seat of stricture, which pass off under the regimen indicated.

There is a simple device which I sometimes find useful in cases of very tight and intractable stricture. We will assume that unsuccessful attempts have been made to introduce a bougie, even after the patient has remained in bed for some

days. The bougie enters the stricture, but no amount of coaxing will induce it to pass right through. Now, in a case of this kind, if we insert the bougie as far as it will go and leave it there, with instructions to the patient to look after it and prevent its slipping out, the probability is that after the lapse of three or four hours the instrument can be readily pushed through. An intelligent patient will second your efforts in this direction, and it is not improbable that on your return visit you may find that he has in the meantime managed to manipulate the instrument into the bladder. The continuous contact of the tip of the bougie with the morbid

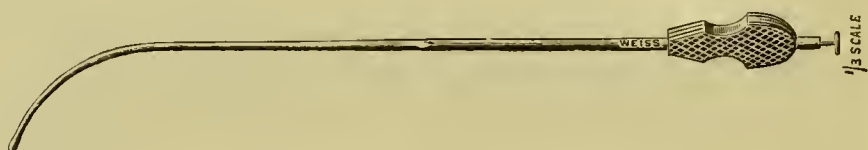


FIG. 13.

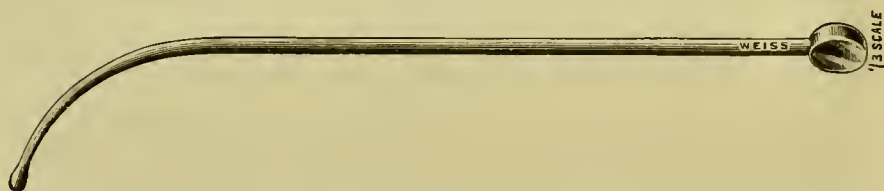


FIG. 14.

tissues dissipates spasm and induces partial resolution of the stricture.

When two or more distinct tight strictures are present, situated at considerable distances from each other, we may have much difficulty in inducing a soft bougie to travel through the canal, owing to its being gripped by the anterior stricture, so that we have no control over its point to manipulate it through the deeper stricture or strictures. Under these circumstances we must frequently have recourse to rigid catheters or bougies, preferably with slightly bulbous points (Figs. 13, 14). When the strictures are situated in the penile portion of the urethra straight instruments will be preferable.



When with these instruments we fail to penetrate the deeper strictures, we must treat the proximal one in the first instance, and when that has been sufficiently dilated to permit of free play of the bougies, attack the next stricture. But, as a rule to which there are few exceptions, strictures, when multiple, diminish in calibre in proportion with their distance from the meatus.

A somewhat similar difficulty to that described in the last paragraph may present itself when the urethra behind a tight stricture is dilated, pouched, and distorted. This condition is particularly prone to occur in the prostatic portion, the mucous membrane of the floor of which may be reticulated and thrown into transverse folds, with deep lacunæ interspersed. In a case of this kind, after we have succeeded in introducing a soft instrument through the stricture, it may be tightly grasped, so that we have no control over its point, which in its onward course may get engaged in one of the lacunæ or folds, and no amount of manipulation will carry it into the bladder. To overcome this difficulty we must withdraw the instrument, and in its place substitute one with a coudée end, which, kept directed towards the roof, will facilitate its onward passage over the irregular floor of the urethra. But if the bougie has in the first instance been introduced with difficulty through the stricture, it may be advisable to tie it *in situ* for a couple of days, the urine being passed beside it, at the end of which time the stricture will probably have sufficiently dilated to permit of the introduction of an instrument into the bladder. But here, again, it may be necessary to have recourse to a rigid instrument, the tip of which, after traversing the stricture, may be guided over the prostatic obstruction by the aid of a finger introduced into the rectum.

When we have to deal with a tight stricture, and for any particular reason, such as threatened retention of urine or

the existence of great irritability of the bladder, it is thought desirable to secure considerable dilatation at the first interview, there is no method of accomplishing this with greater facility and certainty than the following. A filiform bougie armed with a screw on its proximal end is first passed through the stricture; on to this is screwed a fine plated steel dilator (Fig. 15), No. 2, English scale; the soft conductor is then pushed on into the bladder, where it curls up, followed through the stricture by the metal dilator. The latter is then withdrawn and unscrewed, but the soft guide is left in



FIG. 15.

the urethra. The next larger-sized metal dilator is then attached and passed in as before; and so on, till we have dilated the stricture to Nos. 5 or 6, English scale, when the guide is withdrawn and a loosely-fitting catheter—say No. 4, English, tied in. This procedure can, as a rule, be accomplished without an anæsthetic, with the aid of a 5 per cent. solution of cocaine injected into the anterior urethra if necessary. We shall see later on the great advantage of this method of temporarily dilating a stricture under an anæsthetic to enable us to introduce a staff for the purpose of performing external urethrotomy.

Another method of facilitating the introduction of a catheter in difficult cases is to screw a straight, thin steel rod (Fig. 16), like a knitting-needle, on to a soft conductor. This is then passed through the stricture and a tunnel catheter



slipped over the guide, which is then withdrawn, leaving the catheter *in situ*.

Finally, when all these various manipulations fail in our



FIG. 16.

efforts to pass an instrument through a tight stricture, we may find that if the patient be anæsthetized we may succeed with ease in passing one, when it should be tied in and the treatment by continuous dilatation proceeded with.

### LECTURE III.

#### OPERATIVE TREATMENT OF STRICTURE.

WE now pass on to the operative methods of dealing with stricture, of which the most useful and important is

##### Internal Urethrotomy.

This consists in division of the morbid tissues by means of a cutting instrument introduced within the urethra.

The varieties of stricture for which internal urethrotomy is useful are :

1. Those situated at the meatus urinarius, and in the 3 or 4 inches of the urethra immediately behind this, particularly tough fibrous bands encircling the canal. It is found in practice that strictures in these situations are not very amenable to dilatation, and that they rapidly recontract, whilst, on the other hand, they are easily and safely cut.

2. Bridle strictures. These invariably recontract after dilatation.

3. Old confirmed strictures at the bulbo-membranous junction, of fibrous or cartilaginous consistence.

4. Strictures in which dilatation has been tried and failed, owing to the supervention of fever when we attempt to carry the dilatation beyond a certain limit.

5. Resilient strictures, which rapidly contract after dilatation, and cannot be maintained at or near the normal capacity of the urethra by the periodical introduction of instruments.

There are two distinct methods of carrying out this plan of treatment, both of which are associated with the names of eminent French surgeons :

1. Civiale's method, which consists in passing a sheathed blade through the stricture without the aid of a guide, the blade being then projected and the morbid structures divided *from behind forwards* on the withdrawal of the instrument.

2. Maissoneuve's method, in which the incision is made *from before backwards* by means of a blade conducted along a metal guide previously introduced through the stricture.



FIG. 17.

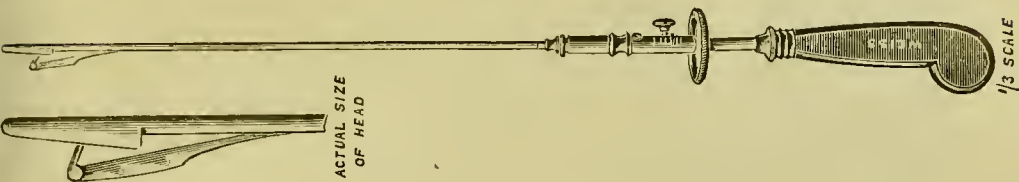


FIG. 18.

Innumerable instruments have, from time to time, been devised for the purpose of carrying one or other of these methods into execution. I shall only describe one of each kind—that which I have found most practical—and the manner of employing it. Before doing so, however, I may mention that the simplest and best way of dividing a stricture at or near the meatus is by introducing a narrow director into the urethra, and along the groove of this a narrow-bladed knife. The stricture is divided on the floor of the canal as the knife is withdrawn. Or the bistouri caché (Fig. 17) may be employed for this purpose.

### Civiale's Method.

Civiale's urethrotome (Fig. 18) consists of a grooved shaft terminating in a conical bulb. Within this bulb is concealed

a sharp blade, which is capable of being projected by means of a mechanism near the handle to any extent required up to the maximum, and as easily returned within the bulb. The degree to which the blade is projected is indicated by a little button moving along a series of notches on the shaft near the handle.

As the bulb of this instrument measures ten of the French scale (5 E.), some preliminary dilatation of tight strictures is necessary to enable it to pass through. This is accomplished by 'continuous dilatation,' which generally occupies two or three days, a catheter of No. 10 F. being tied in the night before the operation. It is not advisable to dilate the stricture beyond this, so that it may oppose to the blade the largest surface possible, and thus facilitate its complete division.

The catheter is left in till the time of the operation, and on its withdrawal the urethra is thoroughly cleansed of the muco-pus that will be present, by injection from a syringe or irrigator of a solution of perchloride of mercury (1 in 6,000).

The urethrotome, sterilized, warmed, and oiled, is then slowly and carefully introduced through the stricture or strictures, as the case may be, till its end is felt quite free in the bladder on movement of the handle from side to side. This urethrotome, you observe, is quite straight; but with a little practice a straight instrument is as easily passed through the urethra as a curved one.

The instrument is now withdrawn till the heel of the bulb impinges against the posterior aspect of the stricture, the blade is projected to the required extent with its edge towards the floor of the urethra, and drawn smartly through the morbid tissues till all resistance ceases, when it is again sheathed. If other strictures exist nearer the meatus, they are treated similarly before the withdrawal of the urethrotome.

The position of the strictures will have previously been

ascertained by means of the olivary bougies, and their distances from the meatus noted, so that at the time of the operation we know where we are likely to meet with resistance to the bulb.

To ascertain if the stricture has been thoroughly divided a large steel dilator (Fig.3), No. 24 F. (14 E.), is gently introduced. No force whatever should be employed, the instrument when properly guided falling by its own weight into the bladder. This is followed by Nos. 26 and 28 F. (15, 16 E.), which should pass as before without the employment of any force. If this latter pass easily, the stricture has been thoroughly cut and the operation is completed.

But if obstruction be offered to any of these steel dilators, the urethrotome should be again introduced and any uncut fibrous bands divided. These steel sounds are to be employed merely as measuring instruments, to ascertain if the morbid tissues have been fully divided up to the normal capacity of the urethra. On no account are they to be used as dilators. I hold that to partially incise a stricture and then dilate it still further is extremely bad surgery, and open to all the objections that have banished divulsion from modern practice. The success of this operation depends on the morbid tissue being completely cut through on one aspect.

Having satisfied ourselves that the stricture has been thoroughly divided, we introduce a large silver catheter, No. 18 or 20 F. (10, 12 E.), draw off the urine and any blood that may have trickled into the bladder, and then wash out the latter with a saturated solution of boric acid by means of a metal syringe or irrigator. I formerly used solution of perchloride of mercury (1 in 6,000), but found that it irritated the bladder, and induced constant desire to micturate when the patient woke from the anæsthetic; whereas our aim should be to have the bladder completely at rest, so that no urine may be passed for eight or ten hours after the opera-



tion, when plastic lymph and blood-clot will probably have sealed the wound and rendered it impervious to urine. I have not found the perchloride solution more effectual in preventing 'urethral fever' than that of boric acid.

### Maissoneuve's Method.

This (Fig. 19) is Maissoneuve's urethrotome, but I consider Tevan's modification of it (Fig. 20) the safest and most



FIG. 19.

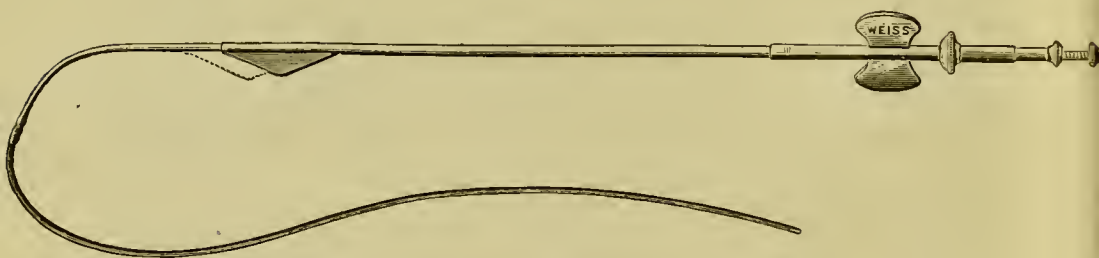


FIG. 20.

efficient for dividing the stricture from before backwards. A filiform flexible bougie, provided with a female screw at its base, is first introduced through the stricture into the bladder. The thin steel grooved staff is screwed on to this. The conducting staff is passed on through the stricture, preceded by the filiform bougie, which curls up in the bladder. The conductor is held steady by an assistant. The sheathed blade is now inserted in the groove of the metal conductor, and pushed along till the sheath is obstructed by the anterior



surface of the stricture, when the sharp blade is boldly projected against it by means of the button at the end of the handle, cutting partly through the morbid tissue, and then allowed to recoil back into the sheath, which it does by the force of a spring in the handle. The sheath is again pushed further home and the blade is once more projected, and so on till all resistance ceases, the stricture or strictures being cut through. Care should be taken that the blade is not pushed as far as the prostate and the latter incised, or severe bleeding may ensue. The instrument is then withdrawn, followed by the filiform guide.

The introduction of steel dilators, to ascertain if the morbid structures have been divided, and the subsequent proceedings are the same as already described in Civiale's method.

As a rule, an anæsthetic should be given for internal urethrotomy; but when this is contra-indicated the operation can be performed without one, with the aid of a 5 per cent. solution of cocaine injected into the urethra beforehand.

The patient must be prepared for the operation. He should remain in bed for a few days beforehand. The kidneys must be working actively, and the urine be free from albumin. The bowels should be opened daily by saline laxatives. If the urine be alkaline, it must be rendered acid by the administration of 10 grains each of boric acid and benzoate of ammonia three times daily. All febrile disturbances must be subdued. Urethritis, if present, must be allayed.

To obviate the occurrence of 'urethral' fever, the operation room should be well warmed and the patient's limbs swathed in flannel, and on transferring him to bed a hot-water bottle should be placed at his feet. On recovery from the anæsthetic he should have a draught containing 5 grains of quinine and 15 drops of liquor opii sedativus. Indeed, for a few days before and after the operation I am in the habit of giving 10 grains of quinine daily in divided doses.

The patient is encouraged to drink freely of barley-water for several days, after the sickness due to the anæsthetic passes off.

In spite of all precautions, however, in a considerable proportion of cases of internal urethrotomy, an attack of so-called 'urethral' fever will occur within the first thirty-six hours after the operation, usually immediately after the first act of micturition. The cold, hot, and sweating stages of malarial fever are exactly reproduced, the temperature generally rising to 103° to 105° F. After considerable experience in India and in this country, I am unable to detect any difference in the symptoms and progress between a typical attack of urethral fever and one of the true malarial intermittent type.

Attacks of this fever are much more common after internal urethrotomy in Europeans who have resided in malarial countries than in those who have never left Europe.

What the cause of 'urethral' fever may be—whether due to septicæmia, disturbance of the central nervous system from urethral irritation, or to congestion and inhibition of the functions of the kidneys through shock of the operation, it is difficult to say. The subject is too abstruse and complicated a one to enter on here. The occurrence, though distressing to the patient and alarming to the inexperienced surgeon, is practically devoid of danger, provided the kidneys do not cease to work. Suppression of urine is a very serious complication, and always indicates the previous existence of diseased kidneys.

The treatment of 'urethral' fever is the same as that of malarial fever: warm clothing, warm drinks, and hot-water bottles in the cold stage, diaphoretics and diuretics during the hot, and avoidance of chill during the sweating stage. It is only when the temperature returns to normal that quinine should be administered.

I do not tie in a catheter after the operation, as was the

practice some years ago. Its presence causes irritation and suppuration in the wound, and induces healing by granulation, which is to be avoided, leading, as it does, to subsequent contraction. It rarely prevented the occurrence for which it was employed, viz., the passing of urine over the wound, for the spasm of the bladder induced by its presence caused urine to flow beside the instrument.

The patient is directed to refrain from micturition as long as possible, generally eight or ten hours. When the desire is imperative, he should be placed in a hot hip-bath, and pass his urine for the first time there. Urethral spasm is thus allayed, owing to the relaxation of the muscles that is induced.

The patient must remain in bed for nine or ten days, after which he may recline on a sofa; but he should not leave his room for a fortnight after the operation. During the first four days he must not even go to the nightstool, for fear of inducing hæmorrhage by the erect position.

The bleeding after the operation is, as a rule, of a trifling character, and consequently in the vast majority of cases no special measures are necessary for preventing this, beyond insisting on the patient remaining in the horizontal position for several days. Should there be a tendency to hæmorrhage, this will generally be arrested by passing a No. 24 F. (14 E.) stiff gum-elastic cylindrical catheter (Fig. 7) as far as the bladder and tying it in for two or three days. Should this be insufficient, a hard pad should be applied to the perineum—it is in the bulbous portion only that hæmorrhage of any consequence takes place—and braced tightly there by an ordinary pair of trousers-suspenders passing over the shoulders, the urine passing through the catheter. In one case only in my practice have I found these measures insufficient: a patient whom I only discovered after operation to be the subject of hæmophilia, in whom the incision was made on the roof of the

urethra by Tevan's urethrotome. In this case I had to open the urethra through the perineum on a staff and tie a hard rubber perineal tube in the bladder for four days. This effectually controlled the bleeding, and the patient made a good recovery.

No instrument should be introduced till the wound has healed, that is, till about a fortnight after the operation, when it will be found that, as a rule, steel dilators, Nos. 22 to 26 F. (13 to 15 E.), can be introduced consecutively with ease, without the employment of any force. The patient should be taught to pass these instruments himself, fortnightly at first, and then at increasingly distant intervals, lest the stricture should show a tendency to recontract.

In accordance with the teaching of Sir Henry Thompson and others, I was formerly in the habit of introducing instruments through the stricture every second day after the third or fourth from the operation, with a view to keeping the wound open during the healing process. I have for some years abandoned this practice. Not only did it cause the patient much pain and induce urethral fever, but it actually defeated the object for which it was employed, viz., the prevention of recontraction, by inducing irritation of the wound and healing by granulation.

I hold that, when the ring of fibrous tissue which constitutes the chief element in stricture is thoroughly cut through in one direction, this more or less elastic band opens out; the cut ends separate, leaving a wide gap between them; free passage is made for the flow of urine; and the plastic inflammatory effusion in and around the scar-tissue becomes gradually absorbed by a natural process, when the source of irritation, viz., the forcible current of urine against the posterior aspect and edges of the narrow opening, no longer exists. At any rate, I submit that if—as I am constantly verifying in practice—at the end of a fortnight the full-sized



instruments I have described can be passed with facility and without pain, their repeated employment before this, with the pain and fever caused thereby, is unnecessary and mischievous.

What are the relative advantages of these two methods of performing internal urethrotomy?

1. By the Tevan-Maissoneuve urethrotome any stricture, no matter how tight, provided we can pass the filiform guide through it, can at once be operated upon; whereas for Civiale's the stricture must be capable of admitting a No. 10 F. (5 E.) bougie, the size of the bulb of the instrument. A stricture can, however, as a rule, be enlarged to this extent by 'continuous dilatation' in two or three days.

2. Civiale's method is much less liable to be followed by hæmorrhage than Maissoneuve's, owing to the incision being on the floor of the urethra, which is much less vascular than the roof.

3. In the after-treatment it is easier to introduce metal dilators when Civiale's method has been employed, owing to the naturally even upper surface of the urethra being left intact, so that the point of the dilator can be kept in this direction as it passes along the canal; whereas, after the Maissoneuve operation there is often a pit left at the seat of the scar in the roof, in which the point of the dilator is liable to hitch.

4. Tough fibrous bands are cut with more certainty by Civiale's instrument in drawing the blade rapidly through the stricture from behind forwards, than by the Tevan's, in which the blade is pushed gradually backwards.

5. When the case is complicated by false passages, or the stricture is very tight, it may happen that there may be some uncertainty about the guide being in the bladder. But with Civiale's instrument, the stricture being partially dilated, its end can be felt free in the bladder.

6. The blade of Civiale's urethrotome is completely under control at any stage of the operation, and can be projected to any desired extent, which is not the case with Tevan's.

Both operations are thoroughly sound and practical. I almost invariably employ Civiale's, regarding it as having superior merits.

Internal urethrotomy, when undertaken in suitable cases and the morbid tissues thoroughly cut through, I consider one of the safest and most important operations in surgery. I have performed it in some 450 cases with five deaths—two from suppression of urine and three from pyæmia. By no other method of treatment are such permanent results obtained.

The question is frequently asked, Is stricture capable of permanent cure? My reply is emphatically in the affirmative. In a large proportion of strictures treated by internal urethrotomy, if that operation be properly performed—that is, if the morbid tissues be thoroughly divided—a permanent cure ensues. 'Once a stricture, always a stricture,' is a stock phrase handed down from the older surgical writers; and no doubt in the days of caustics, divulsion and other imperfect methods of treatment, it contained a strong element of truth, as it did even in comparatively recent times, when the strictures were only cut up to 11 or 12 of the English scale. The morbid tissues, being only partially divided, rapidly retracted unless kept open by the constant passage of bougies. Otis laid the foundation of modern practice when he demonstrated the large natural capacity of the urethra. For eighteen years, since I adopted litholapaxy and fully recognised the large calibre of the urethra, I have been in the habit of dividing the stricture freely in the manner I have described. Patients operated on by this method years ago from time to time turn up to see me, in whom I can find no trace of stricture, though all instrumentation has been abandoned.



As, however, in a large proportion of cases dealt with it is impossible to feel certain that every strand of fibrous tissue has been divided, it is advisable to introduce full-sized instruments at increasingly distant intervals for some time after the operation. When to abandon the practice is a nice question. The patient himself will generally solve it by ceasing to do so, when he finds that after lengthened intervals the instruments pass with ease.

### External Urethrotomy.

This procedure consists in division of the stricture from without by means of a dissection carried down to the urethra from the perineum.

There are two distinct methods of accomplishing this, suitable, respectively, to different varieties of stricture.

1. That generally known as *Wheelhouse's operation*, employed when no guide or staff can be passed through the stricture. The urethra is opened in front of the contraction, the orifice searched for, and the morbid tissues divided on a director.

2. That in which the stricture is divided on a staff previously introduced through it.

The varieties of stricture in which this procedure is called for are :

1. 'Impassable' strictures.
2. Cases complicated with urinary fistula, with inflammatory thickening of the perineum and perhaps scrotum.
3. Tight strictures accompanied by chronic cystitis with foul, alkaline, purulent urine.

In the previous lecture I described the various manipulations and artifices to which it may be necessary to have recourse to enable us to introduce an instrument of some kind through a tight or complicated stricture into the bladder. It is possible, however, that in spite of all the skill and patience we can

bring to bear on the case we may fail to accomplish our object. We are then in the presence of what is termed 'impassable' or 'impermeable' stricture.

In proportion to the skill and experience of the surgeon will such cases be rare. Syme, indeed, laid down dogmatically that there is no such thing as an impassable stricture. He did not, of course, include that condition we occasionally, though rarely, meet with—complete obliteration of the urethra, which sometimes occurs after an accident in which the canal is lacerated or completely divided. But he maintained that, given the requisite skill and perseverance, an instrument can be introduced through any channel by which urine issues, even in drops. I thoroughly endorse this view under the conditions laid down. It must be remembered, however, that few surgeons are possessed of that experience and skill that will enable them to successfully manipulate an instrument through a tight and complicated stricture in all cases. Furthermore, even in the most accomplished hands, the patient will not always consent to lie up for the lengthened period—perhaps a couple of weeks—that the surgeon may be engaged in essaying to accomplish this difficult task. We must therefore reckon on occasionally coming across a case of stricture which is practically 'impermeable,' at least to the instrument of the surgeon.

In cases of this kind we must have recourse to external urethrotomy without a guide, or 'perineal section,' as it was formerly termed.

The procedure generally adopted in this country is that of Wheelhouse, who invented a special staff (Fig. 21) for this purpose. This staff, which is straight, is grooved on one side to within a fourth of an inch from the end, where a small blunt beak or button projects on the other side.

The hair of the perineum having been previously shaved and the patient prepared, he is placed in the lithotomy

position. The staff is passed as far as the stricture, with the groove directed towards the perineum, and held steadily by an assistant. The tip of the staff is felt for, and an incision about 2 inches long made in the median raphé, its centre corresponding with the bulb of the staff, and the urethra opened for the extent of an inch in front of the stricture. The



FIG. 21.



FIG. 22.

edges of the wound are held aside by catch-forceps, or by a loop of silk passed on either side through the margins of the urethra. The beak of the staff is then turned round and hooks up the upper end of the incision. All bleeding having been arrested and the wound carefully sponged, the face of the stricture comes into view, and the opening is searched for,

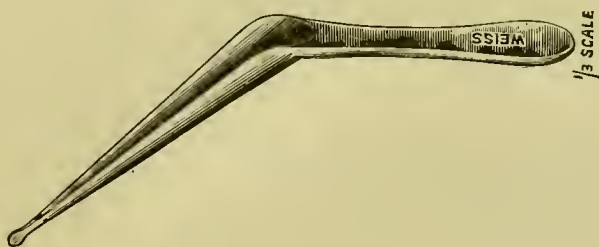


FIG. 23.

and when found a small probe-shaped director (Fig. 22) is pushed through into the bladder. The stricture is cut on its lower aspect by passing along the director a long narrow knife. The beak of a small blunt gorget (Fig. 23) is inserted in the groove of the director and guided thus into the bladder. The staff, forceps, and director are removed, and a stout flexible catheter, No. 12 English scale, introduced through the

urethra and along the gorget into the bladder, in which position it is fixed. Over this the edges of the wound are partially closed by silkworm sutures, and the dressings applied.

The catheter is retained for three or four days, or longer if it does not cause irritation, the urine flowing thereby. After its removal a full-sized steel dilator is introduced every second or third day whilst the wound is granulating, and at more distant intervals when it completely closes.

This is a sound operation. It is sometimes a difficult one, requiring much patience, owing to the trouble that may arise in finding the orifice of the channel through the stricture. A good light is essential, and all oozing of blood must be



FIG. 24.

subdued before searching for the orifice. After this is found there may be difficulty in introducing the probe. One is, as a rule, inclined to hold the probe too vertically; if held rather horizontally, it will slip through more readily.

Formerly I always employed the instruments used by Wheelhouse, but for several years past I have carried out this operation with somewhat different implements. I employ a straight staff (Fig. 24), grooved almost to the end, without any button. When the urethra is opened this is laid aside. A flexible bougie is passed by the urethra till half of it projects through the wound. This latter half is then bent up outside the scrotum and penis and both ends are held by an assistant. A loop is thus formed by the bougie, which holds the upper end of the wound steady—more than can be said of Wheelhouse's staff, which is constantly slipping, the beak being too small to grasp the tissues boldly.

I have had filiform guides made to screw on to the probe-

director (Fig. 25). The fine flexible guide is first introduced through the stricture, the director is screwed on and passed after it, the guide curling up in the bladder. It will frequently be found that a fine flexible guide traverses a tight stricture more readily than a probe.

Syme's operation consisted in introducing a fine grooved staff (Fig. 26) through the stricture and cutting down on this from the perineum, the stricture being thus divided. The subsequent proceedings were the same as those already indi-



FIG. 25.



FIG. 26.

cated in dealing with the preceding operation. The staff had a shoulder which rested against the face of the stricture, thus indicating its locality.

This operation was introduced by Syme for the purpose of dealing with all strictures that were not amenable to treatment by dilatation. As, however, the vast majority of these cases are now best dealt with by internal urethrotomy, Syme's operation has lost its *raison d'être*, and is practically obsolete.

*External urethrotomy on a staff previously passed through the stricture* is now only employed for cases complicated with bad urinary fistulæ, or when drainage of the bladder through the perineum is necessary.



### Author's Operation.

The following is the method of performing external urethrotomy which I myself practise when the stricture is traversable by an instrument.

The patient being anæsthetized and placed in the lithotomy position, if the stricture be a tight one I commence by introducing a flexible filiform guide, on to which is screwed a fine conical steel dilator (Fig. 15), No. 2 English scale. This is passed on after the guide, which curls up in the bladder. The steel dilator is then withdrawn and unscrewed, the guide being left in the stricture. The next larger-sized dilator is

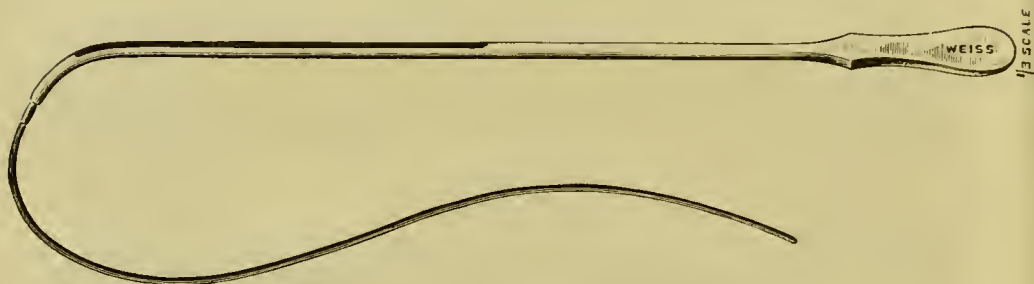


FIG. 27.

screwed on, and passed as before; and so on, rapidly dilating the stricture till a fairly large-sized dilator—say, 6 or 8 E.—is reached, when the staff (Fig. 27) is screwed on to the guide and introduced into the bladder.

These staffs I had specially constructed with a short curve and tapering beak, a female screw being drilled in the end for the reception of the male screw of the guide.

If the stricture admit a fairly large staff without dilatation the above preliminaries are, of course, unnecessary, and the staff is passed forthwith.

An incision a couple of inches long is then made in the median raphe over the site of the stricture and the dissection rapidly carried down through the perineum as far as the staff, and the stricture divided freely. The fistulæ are scraped, and

all sinuses that communicate are laid open, their margins being scraped, or clipped off with scissors if ragged and unhealthy. A blunt gorget is then passed along the groove in the staff into the bladder to facilitate the introduction of the catheter, and the staff with the attached guide withdrawn. The tying in of the catheter and subsequent proceedings are the same as described in the previous operation.

When stricture is complicated by chronic cystitis with purulent ammoniacal urine, with or without the existence of urinary fistulæ, the bladder must be drained through the perineum. A small incision about an inch long and an inch in front of the anus is made in the raphé down to the staff.



FIG. 28.

This incision should, if possible, be in healthy tissue and not involve a fistula. Through this a blunt gorget is passed along the groove in the staff into the bladder, and the staff withdrawn. A stout hard rubber perineal tube (Fig. 28) is then introduced along the gorget into the bladder and the latter withdrawn. A rush of foul urine will take place through the tube as soon as it reaches the bladder, which is washed out with boric lotion. It will in most cases be advisable to withdraw the tube in order that the finger may be inserted into the bladder to explore for stone; for in cases of this kind it will frequently be found that a soft phosphatic concretion is present. This, if it exist, being removed, the tube is re-introduced and fixed in by means of a suture through the edges of the wound. The fistulæ and sinuses, if present, are treated as already described. The dressings having been applied, the urine is conducted by a rubber tube, attached to the perineal tube, to a vessel beneath the patient's bed.

As to the treatment of the stricture, three courses are open to us :

1. To extend the perineal incision and at once divide the stricture.

2. To deal with it by internal urethrotomy.

3. To leave it for subsequent treatment by dilatation.

If the stricture be single, tight, and deeply placed, it should be dealt with at once by extending the incision, so as to divide it thoroughly.

If multiple, the deep stricture can be dealt with by external urethrotomy, and the penile one by internal urethrotomy at the same time.

If single and not very narrow it is best left alone, and subsequently treated by dilatation. It will be found in such cases that when the urine is carried off by the perineal drainage-tube the inflammatory thickening in and around the stricture will rapidly subside. Absorption of the morbid products takes place, so that after ten days or a fortnight a good-sized steel dilator can be introduced with facility, and the stricture dilated by the gradual method. I have frequently verified this in practice, even when the stricture is comparatively narrow—thus affording another proof that true absorption of the morbid products of stricture does take place, when the friction and irritation caused by the flow of urine against its contracted margins are removed.

The bladder should be washed out daily with boric or weak permanganate of potash solution, and the perineal tube not finally removed till the fistulæ have quite healed, when the artificial fistula—the track of the drainage-tube—is allowed to close, steel dilators, of course, being periodically introduced.

This is sometimes a tedious process, this fistula remaining open for months, and requiring to be stimulated from time to time by the electric cautery. I cannot at all endorse the light-hearted manner in which some surgeons write about

external urethrotomy. In fact, I regard this operation as a necessary evil, to be had recourse to only when other measures fail or are found impossible.

### Urethrectomy.

This operation consists in total excision of the morbid tissues which constitute the stricture. It is employed for traumatic strictures which are found intractable to other forms of treatment.

The preliminary stages of the operation are the same as for external urethrotomy when no staff can be passed through the contraction. When the face of the stricture is exposed a metal probe is introduced through its opening in the manner already indicated when dealing with external urethrotomy. The ring of scar-tissue is then resected by means of blunt-pointed scissors curved on the flat, the cylindrical section of the urethra involved in the stricture being completely removed. The severed portions of the urethra are brought together by sutures. The edges of the upper aspect of the urethra are first approximated by means of two or three catgut sutures passed through the mucous membrane and submucous tissues and tied within the canal. A gum-elastic cylindrical catheter, No. 12 English scale, is then introduced through the meatus as far as the bladder, and secured there. Outside this the margins of the sides and floor of the urethra are brought together by fine silk or catgut sutures passed through the submucous tissues after the manner of Lembert's sutures—not entering the canal. The surfaces of the perineal wound are then brought together over all by means of silkworm gut sutures, when the operation is completed, and the dressings applied.

The catheter should not be removed for three or four days, when it is replaced by another of similar size, very gently introduced, after irrigation of the urethra to remove any



mucoid discharge that may be present. This second catheter should be removed on the third or fourth day; also the superficial sutures from the perineum, when union should have taken place. A steel dilator is passed once a week at first, and then at more distant intervals.

This operation is only practicable when the stricture is situated in the perineal portion of the urethra, where the traumatic variety usually occurs, as it is only here that the submucous tissue is sufficiently extensile to permit of the mucous membrane moving on it to such an extent that the severed ends of the urethra can be approximated without any tension being placed on the sutures. It is only applicable when the length of the stricture is not more than half an inch. The presence of pus in connection with the stricture also renders the prospect of success of this operation doubtful.

I have undertaken this operation in several cases, sometimes with complete success, sometimes with indifferent results. It is surprising the ease with which the ends of the divided urethra can be approximated without any undue tension on the sutures. The main causes of failure are the difficulty of excluding pus—which is almost invariably present at the site of the stricture—from the wound, and the danger of urine passing beside the catheter, thus infecting the wound.

I will, in conclusion, briefly allude to two other methods of treating stricture which at different periods in the past enjoyed considerable popularity, but which have now almost vanished from practice—I refer to ‘divulsion’ and ‘electrolysis.’

#### Divulsion.

The first of these methods was best known in this country as ‘Holt’s operation,’ and consisted in rupture of the stricture by forcibly separating the two blades of a split sound, intro-



duced through the canal, by means of a wedge rapidly advanced between them. This operation has now disappeared from practice owing to (1) the difficulty in restricting the splitting process to the strictured portion of the canal, extensive laceration of the healthy mucous membrane frequently taking place; (2) the shock caused to the system inducing rigors and suppression of urine more frequently than by any other method of treatment; and (3) the rapidity with which recurrence of the contraction took place.

### Electrolysis.

The electrical current has been employed with a view to inducing decomposition of the morbid tissues of stricture by electrolysis. Great results were anticipated from this process at first; but in late years it has fallen into abeyance, the results having been found to be only temporary. Instruments of gradually increasing size are passed through the stricture for the conveyance of the electrical current; and it is now recognised that to the dilatation thus induced, and not to the electricity, was due the temporary improvement that took place.

#### LECTURE IV.

### ENLARGEMENT OF THE PROSTATE: ITS NATURE, PATHOLOGY, SYMPTOMS AND DIAGNOSIS.

TO-DAY I propose considering with you that condition commonly called 'hypertrophy of the prostate,' an enlargement of the organ incidental to declining years, and which frequently causes obstruction to the urinary flow. It is sometimes named 'senile' enlargement, a not particularly appropriate description, as the disease, if it occur at all, sets in long before senility in the general acceptation of that term supervenes, and one that men who have scarcely turned middle life sometimes resent as offensive. As the disease is not a hypertrophy as generally understood, perhaps the most appropriate description would be enlargement of the prostate of declining life; but for brevity we will refer to it simply as 'enlargement of the prostate.'

It will be convenient in the first instance to briefly recall some of the characteristic features of the healthy organ. The prostate is a glandular body which surrounds the neck of the bladder and the adjacent inch of the urethra. In the adult it is of the size and shape of a chestnut, being about  $1\frac{1}{2}$  inches broad, 1 inch long, and  $\frac{3}{4}$  inch deep. Its average weight is 6 drachms. The base is directed backwards towards the bladder, the neck of which it embraces, and the apex forwards, touching the triangular ligament. The under surface, which is smooth and slightly grooved longitudinally, rests on the

rectum, with which it is connected by dense fibrous tissue. The prostate consists of two lateral lobes and a median portion placed at the under and posterior aspect of the organ, between the ejaculatory ducts, which perforate the lower part of the gland obliquely before opening into the prostatic urethra. This median portion is, as a rule, a mere transverse band, but occasionally a rounded prominence is formed in this situation even in the healthy organ, forming a true third or middle lobe, which, as we shall presently see, plays an important rôle in enlargement of the gland. It is to be noted that this median portion lies immediately beneath the neck of the bladder, forming, in fact, its floor.

Structurally, the prostate is composed of glandular substance and a stroma made up of muscular and fibrous tissues. The glandular substance consists of follicular pouches with ducts, lined with columnar epithelium. The excretory ducts, from twelve to twenty in number, open into the urethra beside the *veru montanum*. The muscle forms the bulk of the prostate, its function being to eject the glandular secretion, or prostatic fluid, to mix with that from the ejaculatory ducts.

It is now recognised that the prostate is a purely sexual organ.

The prostate has a tendency to increase in size in a large proportion of men after the age of fifty years, but the enlargement does not generally declare itself by any marked symptoms till after fifty-five years. This rule does not hold good in India, for it is generally recognised by surgeons in that country that decided symptoms of enlargement of the organ manifest themselves in natives as early as at the age of forty-five years. It must be borne in mind, however, that the expectation of life in Orientals is about ten years less than in Europeans—that is to say, a native of India is at forty-five years of age comparatively as old a man physically and

sexually as a European is at fifty-five years. Even in Europe we occasionally meet with instances of true enlargement at an earlier age, but they are not sufficiently numerous to invalidate the general rule laid down.

It is estimated from statistics collected by Thompson and others that about 33 per cent. of men beyond fifty-five years of age are subject to enlargement of the prostate, but not more than 5 per cent. ever suffer from symptoms.

The overgrowth may be uniform in character, the hypertrophy extending equally to all parts of the gland, which thus preserves its symmetry. This is the form of enlargement that is least liable to be attended by symptoms. But any one or two of the three lobes into which the organ may be divided surgically may assume a more pronounced overgrowth than the remaining portion of the gland. Thus there may be a very marked enlargement of one or both lateral lobes, the middle lobe being scarcely prominent, or there may be an outgrowth of the latter to such a degree as to cause obstruction, or even retention, of urine, and no enlargement of the general body of the gland be felt through the rectum. It is the enlargement of the middle lobe that gives rise to the most urgent symptoms. Situated as it is immediately beneath the inner orifice of the urethra, even a small nipple-shaped projection of the median portion may give rise to troublesome symptoms by presenting a valvular obstruction to the flow of urine. This lobe has a tendency to grow upwards and inwards into the bladder, pushing the trigone before it, and forming a pyramidal tumour with narrow pedicle, which during micturition falls against the urethral orifice, plugging it somewhat after the manner of the glass ball in a soda-water bottle.

If we examine the enlarged prostate histologically we find that all its constituents are invariably increased, though, as a rule, to an unequal degree. It is not a neoplasm, the micro-

scope revealing no new elements; nor is it the result of inflammatory action. It is an irregular hypertrophy of the organ, but not of a compensatory character, no useful purpose being served thereby. Sometimes the overgrowth is mainly confined to the stroma, and particularly to the fibrous elements, thus partaking of the character of a fibro-myoma. As a rule, however, hypertrophy of the glandular tissue predominates to such an extent that some authorities regard the enlargement as an adenoma throughout its whole course, as it would seem always to be in the beginning. The most important feature of the enlargement from a surgical point of view is the presence of localized overgrowths with more or less defined capsules, forming the so-called 'prostatic tumours' (Fig. 38), which may occur in any part of the gland. These are always confined within the capsule of the prostate; though, carrying the capsule before them, they may project from its surface as bosses, or form polypoid-like outgrowths projecting into the cavity of the bladder and connected with the main body of the organ merely by a narrow pedicle, which, however, is always composed of true prostatic tissue.

The average weight of the normal prostate being 6 drachms, one weighing 7 drachms is regarded as hypertrophied, and the weight may increase to several ounces. In size the enlarged prostate may reach from anything beyond that of a chestnut to that of an orange, or even of a cocoanut.

The urethra and bladder will be altered in shape in accordance with the size and form of the overgrowth. The prostatic urethra is invariably lengthened and may attain to 4 inches, so that 12 or 13 inches of catheter may be introduced before the urine begins to flow. When the lateral lobes are symmetrically enlarged the urethra is compressed from side to side, and on section resembles a vertical slit. When one lobe only is enlarged the urethra, being diverted to the opposite side, will be curved laterally. If the median lobe be hyper-



trophied the urethra will be curved upwards towards the inner orifice, and if it be very large, pyriform, and projecting into the bladder, there will be a channel on either side, the urethra being Y-shaped. When the overgrowth assumes the form of a collar round the neck of the bladder, as it sometimes does, the urethra will necessarily be contracted at this situation.

The prostate being debarred from expansion in front by the triangular ligament and beneath by the dense fascia between it and the rectum, in its enlargement it gradually advances backwards and upwards in the direction of least resistance. The urethra is carried with it, and the inner orifice placed on a higher level than the base of the bladder, which remains stationary. A post-prostatic pouch is thus formed in the bladder, which is never emptied of urine during the acts of micturition. This remaining quantity of urine, which is termed 'residual,' gradually increases in quantity as the hypertrophy progresses and the muscular power of the bladder diminishes, owing to the persistent overstrain that the organ is subjected to in order to overcome the obstruction to the flow of urine. In the early stages of the disease there is a compensatory hypertrophy of the bladder walls to overcome this obstruction, but in time, owing to the constant straining, atony and dilatation ensue, so that the bladder may contain several pints of urine. The walls may become extremely thin, or muscular trabeculæ may develop, between which the mucous membrane bulges outwards, forming saccules of various sizes. In course of time changes occur in the ureters and kidneys from the backward pressure due to the obstruction of the urinary flow—changes similar to those that have already been described as taking place in connection with stricture of the urethra. Hæmorrhoids and prolapsus ani also occur frequently in connection with this disorder from the constant straining in micturition.

### Theoretical Causes of Prostatic Enlargement.

Many theories have, from time to time, been put forward to account for the enlargement of the prostate peculiar to declining life, none of which, however, can be said to fit completely with all the phenomena attending this disorder. I shall confine myself to stating briefly the two rival views that at present hold the field.

Guyon and the French school generally maintain that the enlargement of the prostate is not a purely local disease; that it is merely a local manifestation of a constitutional disorder which commences with general arterial sclerosis and ends in fibroid degeneration; that the genito-urinary organs—prostate, bladder, ureters, and kidneys—are liable to undergo this change in a pronounced form, the muscular and glandular structures being replaced by dense fibrous tissue, but that these latter changes are never independent of general atheroma. The enlargement of the prostate and changes already described as taking place in the urinary tract behind are held to be coincident and not related to each other as cause and effect. It is pointed out in this connection that all the symptoms commonly regarded as the result of hypertrophy of the prostate may occur when there is no enlargement of that organ, as a result of sclerosis of the bladder.

Against this theory it is urged that the fact that atheroma and enlargement of the prostate occur together is no proof that the latter is the result of the former—as well might cancer and other diseases which are liable to occur during the atheromatous age be attributed to this degeneration; that enlargement of the prostate occurs when there is no such general atheroma of the system; that arterial sclerosis induces atrophy rather than hypertrophy; that enlargement of the prostate frequently commences before the atheromatous period;

and that this enlargement always commences as adenomatous overgrowth and not as fibroid degeneration.

The other theory is that propounded by Velpeau, and at present supported by some of the highest authorities in this country and America, notably Thompson and White, viz., that enlargement of the prostate is analogous to fibroid disease of the uterus. In support of this view it is pointed out that the utricle of the prostate is the equivalent of the uterus (and vagina); that the structure of the prostate and uterus are somewhat similar; that there is a great resemblance in structure, position, and mode of growth between the fibro-myomata found in the uterus and the overgrowths that constitute enlarged prostate; and that the disease in both instances sets in when sexual activity is on the wane, and does not originate when that activity has completely ceased.

In opposition to this view are advanced the facts that the utricle, which is the true analogue of the uterus, takes no active part in the prostatic enlargement and that the uterine tumours commence as fibro-myomata, whereas the prostatic overgrowths originate as adenomata.

One of the most important effects, from a surgical point of view, of the acceptance of Guyon's theory, if carried to its logical conclusion, would be to prohibit the employment of any form of operative interference aimed at the radical cure of the disease—to limit the treatment, in fact, to the palliative kind. Whatever may be thought of the other view, it offers, at any rate, a plausible basis for active interference, as will subsequently appear.

### Symptoms.

We now come to the symptoms of enlarged prostate. A man aged over fifty years consults you because (1) he finds that for some time he has suffered from increased frequency of micturition which troubles him more at night than through-

out the day; (2) he has some difficulty in starting the stream; (3) there is diminution in the strength of the urinary flow, which instead of being projected in the normal curve falls directly downwards from the meatus simply by its own weight; (4) he strains to propel the urine onwards, but his efforts have little or no effect in strengthening the stream, but, on the contrary, the straining may arrest the flow completely; (5) there is incomplete stoppage, as indicated by dribbling at the end of micturition; and (6) there may be intermittency of the flow due to the ball-valve action of the middle lobe. If the patient does not complain of pain, beyond perhaps an undefined aching about the perineum, and there is no hæmaturia, the case is in all probability one of enlargement of the prostate in a comparatively early stage.

It will be observed that none of the symptoms are referable to the prostate itself. They are attributable to interference with the functions of the urethra and bladder caused by changes in the gland, which are so gradual that they do not cause pain like inflammation or malignant disease. As the disease progresses, unless relieved by art, all the symptoms are aggravated, and others, notably pain and hæmaturia, supervene.

In the early stages of the disorder the increased frequency of micturition is due to some outgrowth at the neck of the bladder, which acts as an irritant, like a foreign body, to this the most sensitive portion of the organ. Local congestion or even inflammation of the mucous membrane ensues, and this induces further frequency. Later, another factor comes into play: a post-prostatic pouch is formed in which a gradually increasing quantity of urine is retained after micturition. This retained urine is, as we have already seen, termed 'residual,' and the manner in which it causes increased frequency requires some explanation.

The bladder is a reservoir capable of containing a certain



quantity of fluid, which is voluntarily discharged at convenient intervals. Let us assume that the quantity passed in twenty-four hours is 50 ounces, and that the capacity of the bladder is 10 ounces. It will thus be necessary to empty the bladder at least five times in the twenty-four hours. But if, the actual capacity remaining the same, a pouch is formed in the bladder containing, say, 4 ounces of urine that is never expelled, it follows that the *effective* capacity is reduced to 6 ounces, so that in order to get rid of the 50 ounces that daily flow into it the bladder must be discharged of these 6 ounces about eight times. As the pouch enlarges and the bladder walls grow weaker the quantity of fluid permanently retained increases and its *effective* capacity diminishes, so that eventually micturition has to take place every half-hour or even less. Indeed, this condition may advance to such an extent that the bladder is incapable of discharging any urine whatever, when we have another symptom, viz., continuous dribbling, the urine passing away by day and night as rapidly as it enters the bladder, but the latter always remaining full. The urine passing in this condition is termed the 'overflow' and has to be distinguished from 'incontinence,' a rare occurrence in certain spinal complaints in which the urine runs away from an empty bladder.

The frequency of micturition is, as already stated, worse at night, or, rather, towards the latter part of the night, and in the early morning on rising—in this respect contrasting with the frequency due to stone, which is always worse in the daytime when the patient is going about. Why this should be so has not as yet been satisfactorily explained. It cannot be due to the recumbent position alone, for it does not occur in the daytime if the patient keeps lying down, provided he remains awake. It may, as has been suggested, be due to the fact that during the first sleep of the night the bladder is not relieved for a longer period than usual. Distension of the



bladder results, with congestion, giving rise to increased frequency, which does not subside for some hours till the congestion has subsided.

The urine in the early stages of the disorder is clear and acid. The quantity will probably be increased and the specific gravity be lowered—changes due to fibroid degeneration of the kidneys met with in elderly persons, particularly when prostatic obstruction is also present. As the disease advances the urine becomes cloudy and gives off a fishy odour. Sooner or later the urine has a tendency to decompose, whether as a contingency of catheterism or otherwise, cystitis sets in, and pus is deposited on the bladder walls in thick flakes. This condition is favourable to the formation of phosphatic calculi, which are a frequent complication of enlarged prostate, lying in the post-prostatic pouch or in the cysts formed, as already described, by the bulging out of the mucous membrane between the muscular trabeculæ.

### Diagnosis.

With the presence of symptoms that point to the probable existence of enlargement of the prostate we proceed to verify our diagnosis by a physical examination of the urethra and rectum.

The patient is first directed to pass all the urine he can, and we note the strength and general character of the stream. He is then placed on his back on a couch; the glans and foreskin are thoroughly washed with an antiseptic, and a catheter, 13 or 14 of the French scale (7 or 8 E.), is slowly and carefully introduced. Our choice of catheters will lie between a Jaques's vulcanized rubber (Fig. 29), a very pliant cylindrical gum-elastic (Fig. 7), or a French coudée (Fig. 30). This latter is, as a rule, the most easily introduced. It should be held almost horizontally at first, with the curved point turned downwards, and gradually elevated into the per-

pendicular position as the instrument passes onwards through the urethra and into the bladder. It should be noted if there be any obstruction at the neck of the bladder, and if the end of the catheter rides over it, which would probably indicate an enlarged middle lobe. The quantity of urine drawn off, if any, indicates the amount of 'residual' urine. This will vary from a few drachms to 3 or 4 pints, according to the stage the disease has reached when the patient first comes under examination. If the quantity be considerable he will express surprise, seeing that he had just previously passed urine, and was under the impression that he had emptied his bladder.



FIG. 29.



FIG. 30.

If the quantity of urine be large, the whole of it should not be drawn off at the first interview, lest the patient may faint, or hæmorrhage set in from the vessels of the bladder giving way through loss of their habitual support. If the quantity be moderate, a second or third examination should be made to avoid error as to the real amount of the 'residual' urine. Before introducing the catheter the hypogastric region should be palpated, for in this way it may at once be recognised that the bladder is distended with urine.

We next make a digital examination of the rectum. The forefinger is greased, the crevice beneath the nail having been previously filled with soap, and introduced slowly and gently to avoid giving pain, and a careful survey of the prostate is made. The extent of the enlargement, if any, should be

noted, and whether this is general, or confined more to one side than the other; whether the contour of the gland is smooth or nodulated; what its consistency, whether soft, indicating adenomatous enlargement, or hard from fibroid overgrowth; also if pressure on the gland gives pain, and, if so, to what degree. Much pain with fluctuation would suggest the probability of abscess, particularly if the patient has had fever recently. Intense hardness with nodulation would suggest malignant disease; and a very hard nodule in the substance of the gland, accompanied by tenderness on pressure, the presence of a calculus in the organ. The finger should pass beyond the gland if possible, and sweep the base of the bladder, to ascertain if this is normally soft, or hard from sclerosis. Possibly a stone may be felt in the post-prostatic pouch. The examination will be facilitated by making counter-pressure on the abdomen above the pubes with the other hand.

The patient should next be placed on his knees on the couch, with his head bent forwards and downwards, and the buttocks rendered prominent by the thighs being flexed on the legs. The finger is again introduced and the rectum surveyed as before. This position renders the prostate more prominent in the rectum than the recumbent one, and the finger can be introduced farther. The impressions conveyed to the finger in both positions are contrasted, and important information may thus be acquired.

Little information with reference to the condition of the middle lobe will be gained by rectal examination. In fact, there may be great outgrowth of this lobe into the cavity of the bladder when no enlargement of the gland is recognised by the rectum. It will, as a rule, be desirable to ascertain the extent and form of the enlargement of the middle lobe. A rough estimate of this can be arrived at by the introduction of a short-beaked sound. When the instrument has entered

the bladder the handle is depressed between the thighs, and the beak rotated to one side and then to the other, feeling on which side of the instrument the enlarged middle lobe lies, and to what extent it projects into the bladder. If the finger be introduced into the rectum whilst the sound is in the bladder, a rough idea of the size of the outgrowth may be formed.

Examination of the bladder by the cystoscope will in a large proportion of cases give a still more correct estimate of the size and shape of the middle lobe, and as to whether or not it is capable of being removed by operation in a manner that will be described later. At our first visit, however, it will not be advisable to employ either sound or cystoscope. This should always be deferred to a later interview, when the patient should be examined in his own room. At the first visit we rest content with the information gained by the catheter and by rectal examination, taken in connection with the general symptoms.

After examination the patient should go home and to bed for the day. Indeed, when the case is at all far advanced and the patient feeble, it will be advisable to postpone the introduction of even a catheter till he is in his own room.

## LECTURE V.

### TREATMENT OF ENLARGED PROSTATE AND ITS COMPLICATIONS.

PASSING on to the treatment of enlargement of the prostate, you are aware that in this field of research considerable activity has been displayed by surgeons in recent years as regards operative interference. Holding, as I do, that in certain selected cases of this disorder an operation of some kind is advisable, and in a small minority imperative, to save the patient's life or ameliorate his sufferings, I have no hesitation in saying that in the vast majority the only admissible treatment is judicious and cleanly catheterism combined with careful hygienic living, and that by these means life will be more prolonged and existence rendered more tolerable than by any other.

When enlargement of the prostate is unattended by any symptoms no treatment is necessary. If, however, decided symptoms of obstruction are present, but the bladder contains no 'residual' urine, or only an ounce or two, the question arises as to what treatment, if any, is desirable. In such cases I am in the habit of passing a large steel dilator (Fig. 31) as far as the bladder once a week, and leaving it in position for ten or twelve minutes, commencing with a No. 11 or No. 12, English scale, and gradually advancing to No. 15 or No. 16. I entirely concur in the opinion of my colleague, Mr. Reginald Harrison, as to the beneficial effect of this simple procedure. It probably does not stay the



progress of the disease, but the periodical introduction of the dilator causes absorption of the gland around the urethra and maintains the patency of the channel, thus staving off for an indefinite period the necessity of having recourse to habitual catheterism.

It is customary in cases of this kind in the incipient stage of enlargement to administer ergot, with a view to causing reduction, or retarding the advance, of the outgrowth. I am in the habit of employing the liquid extract of this drug combined with a saline, both in hospital and private practice.

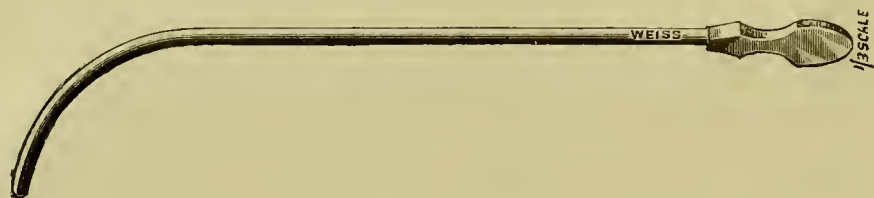


FIG. 31.

It is difficult to say definitely whether the ergot has any effect in staying the advance of the enlargement, but it seems to relieve congestion, and patients undoubtedly express themselves as improved under its administration.

It will, as a rule, be unnecessary to have recourse to the habitual use of the catheter till the residual urine amounts to between 3 and 4 ounces, but if the frequency of micturition at night is such as to affect injuriously the patient's health through want of sleep, it will be desirable to commence earlier. When, however, once about 4 ounces of residual urine have been reached habitual catheterism must be employed, and the patient enters on what is termed 'catheter life,' from which he can scarcely ever recede. When the 'residual' urine is limited to 4 ounces or less, it will, as a rule, be sufficient to pass the catheter once in the twenty-four hours, and the best time for doing this is at bedtime, so that he may have several hours of sleep afterwards. If 6 ounces are retained the

catheter should be employed twice daily; if 8 or 10 ounces, three or four times daily. When all power of voluntary micturition is lost, the catheter must be used whenever the desire for urination is decidedly felt, generally every four hours or so. On no account should the patient be limited to any specific time within which he should not employ the catheter. The urine should be drawn off before pain or marked discomfort is felt, otherwise congestion of the prostate and bladder resulting in cystitis will be produced.

The patient must be taught how to use the catheter, and he should never be without one—that is to say, if he leaves home on a journey, or in the course of his ordinary occupation, he should always carry one about with him, for he may find at any time that its employment is imperative. Indeed, the sooner the patient recognises that the primary duty of his life is the employment of his catheter the better.

A soft coudée catheter (Fig. 30), No. 7 to 9 E., whichever passes most easily, is, as a rule, the best for habitual employment. The patient, unless very infirm, passes it standing. There is now no danger of his fainting, for the quantity of urine allowed to accumulate is limited, and during the period of instruction in the use of the catheter that he will have undergone at the hands of the surgeon he will have acquired confidence in its use. The instrument is held perpendicularly whilst its end is introduced into the urethra. It is then gradually depressed into the horizontal position as it glides along the canal over the obstruction and into the bladder, the curved end being directed upwards towards the roof of the urethra. Sometimes a well-polished vulcanized rubber catheter (Fig. 29) answers best. A timid patient likes it, as less liable to pain him; but if the prostatic urethra is narrowed from pressure of the lateral lobes it is not so easy to introduce as a more rigid instrument. It has also the disadvantage that, its walls being stout, the channel is com-

paratively narrow, so that the urine, if at all thick, will not flow through it readily. On the other hand, as it can be boiled without injury, it is readily rendered aseptic, and as it coils up in a small space it can be carried about very easily. A soft and pliant cylindrical catheter will pass readily and answer best when there is no obstruction caused by the middle lobe. When this lobe is much enlarged a bicoudée catheter

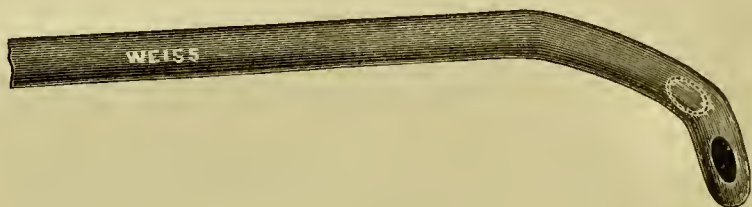


FIG. 32.



FIG. 33.

(Fig. 32), or a well-curved one terminating in a coude (Fig. 33), may be necessary to overcome the obstruction. Formerly it was customary to keep catheters mounted on a well-curved metal stylet ready for use; they are now woven with this curve in their manufacture and retain their shape permanently.

It will be rarely desirable for a patient himself to pass a metal catheter. When circumstances arise requiring its employment the surgeon should be called in.

Whatever instrument is employed it must be kept scrupu-

lously clean. The life and comfort of the patient depend not less on the cleanliness of his catheter than on the judicious use of the same. It will not be out of place, therefore, if I here direct your attention to the antiseptic precautions necessary in the employment of urethral instruments in general.

The instruments required for catheterism are of three kinds—metallic, soft rubber and gum-elastic. The first two are most easily and effectually sterilized by boiling. They should be thoroughly washed and syringed through with soap and warm water and then boiled for ten minutes, after which they are transferred to boric lotion ready for use. Gum-elastic instruments cannot be boiled without injury. They are best cleansed by washing and syringing them through with soap and warm water, and then placing them in a 1 in 40 solution of carbolic acid for ten minutes, after which they are placed in boric lotion before use. Prolonged application of strong antiseptics renders them rough and useless.

Before introducing an instrument of any kind into the bladder, the foreskin and glans should be well washed with soap and water, and then swabbed with some weak antiseptic lotion. If there be any discharge from the urethra the anterior part of the canal should be syringed out with warm boric lotion, but otherwise this precaution is unnecessary. Bacteriologists tell us that even the healthy urethra swarms with organisms that cannot be completely got rid of by the most thorough irrigation by antiseptic lotions, so that theoretically speaking, the introduction of an instrument into the bladder ought to be attended frequently by infection of the urine. Clinical experience, however, teaches us that with the simple precautions indicated this may be avoided.

It is useless to lay down an elaborate ritual of urinary asepsis which cannot be followed out in practice by the patient himself. If we only reflect [on the frequency with



which a man who has entered on catheter life has to pass an instrument, and the circumstances under which he has often to do so, it is obvious that the means of keeping his catheter aseptic, to be efficient, must be as simple as possible. Fortunately in soap and water we have an efficient, convenient and practical method of cleansing catheters, and this is what most patients have to rely on, and that with impunity. After using the catheter it should be again washed as before, thoroughly dried, and then placed for future use in a corked glass tube or covered dish. The best way of drying soft catheters is by pressing them between folds of lint or gauze, in which they may be kept till again required.

The powerful antiseptic properties of trioxymethylene, a white powder obtained by evaporation of formol, have recently been taken advantage of on the Continent for sterilizing gum-elastic catheters. This powder gives off slowly a vapour which is really formol in its gaseous form. If the catheters be placed quite dry on trays in an air-tight box (Fig. 34) with this powder enclosed between folds of lint, they are rendered quite aseptic in twenty-four hours by the vapour given off. Before use they should be placed in boric lotion, as the formol is slightly irritant to the mucous membrane of the urethra. The catheters can also be sterilized in a glass tube fitted with a cork (Fig. 35) containing the powder, which evaporates through a fine grating on its inner aspect. Some patients of mine speak highly of the convenience of this method of rendering catheters aseptic.

As lubricants for instruments fresh olive-oil or castor-oil or vaseline may be used. Carbolic acid should not be added; it irritates the mucous membrane if the proportion used be of any strength, and weak carbolized oil has practically no sterilizing effect. Guyon's pomade, composed of equal parts of glycerine, powdered soap, and water with 1 per cent. of phenol or naphthol, is a clean and efficient lubricant.



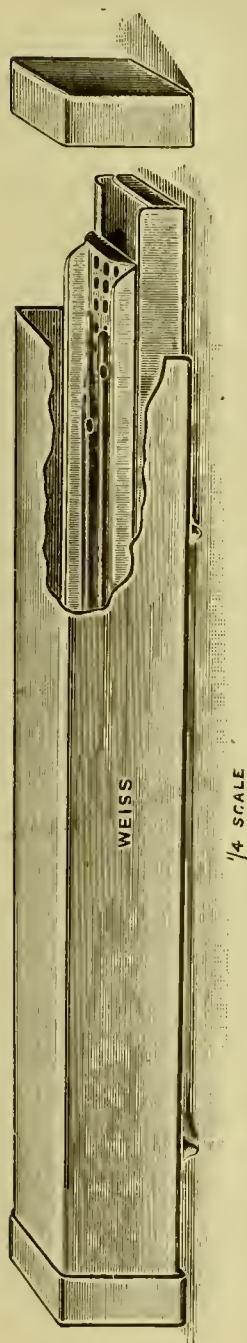


FIG. 34.—JANET'S CATHETER STERILIZER.

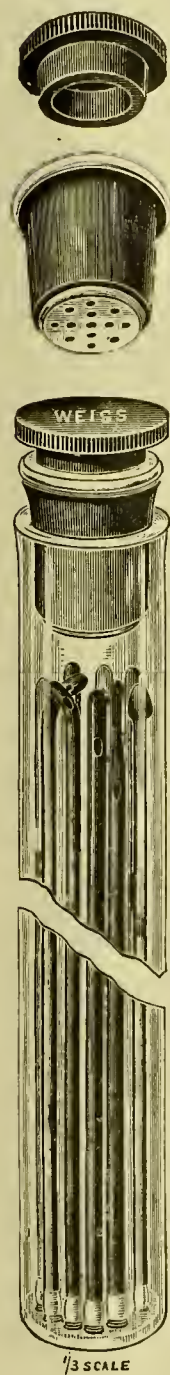


FIG. 35.—DENOS'S CATHETER STERILIZER.

The general or hygienic treatment is most important. The diet should be light, simple and nutritious. Vegetables and

fruit, particularly baked or stewed apples, should be taken regularly, but tomatoes, asparagus and rhubarb should be avoided, as they act as irritants to the urinary tract. The less stimulants taken the better. The clothing must be adapted to avoid cold; the patient should be swathed in flannel. Sitting on cold or wet seats should be particularly avoided, to guard against congestion of the prostate. The daily warm bath, best taken at bedtime, promotes the action of the skin and relieves local congestion about the prostatic region. The most important part of the general treatment is the regulation of the bowels. If they become at all constipated the urinary symptoms are aggravated. Measures should therefore be taken to induce a soft, but not liquid, motion daily. There is nothing better than confection of sulphur or senna, or equal parts of both. Aloin, liquorice-powder and the sulphate of soda are useful, or one of the natural bitter saline waters may be taken in the morning. The enema should always be at hand for use in case the other medicines should fail to induce a daily motion. If pain be present an opiate must be given by the mouth, hypodermically, or as suppository. On no account should belladonna be administered whilst the bladder retains any vestige of expulsive power, owing to its paralyzing influence on the muscles of that organ. Walking or carriage exercise should be taken daily, rough roads being avoided, but riding on horseback or on a bicycle should be abandoned on account of the shaking or direct pressure on the prostate caused thereby. The patient should as far as possible pursue his ordinary avocation and pleasures, but sexual excitement should be avoided. Many men pass useful and enjoyable lives for fifteen or twenty years, or even longer, after entering on the habitual use of the catheter.

### Complications and Difficulties.

There are certain difficulties and complications incident to catheter life to which I will now direct your attention.

When the surgeon is consulted at a comparatively early stage of the disorder, before the residual urine amounts to more than a few ounces, if careful asepsis be employed in the introduction of instruments, the entry on catheter life is effected without any constitutional or local disturbance, and matters run smoothly. The patient takes to his new existence, sadly and perhaps unwillingly at first; but he soon bows to the inevitable, and is grateful for the relief that surgical art has given him through the agency of the catheter.

If, however—and this is what happens in a large proportion of cases that come under observation—through wrong advice, or that timidity about consulting the surgeon that induces elderly men suffering from urinary troubles to put off what they regard as the evil day as long as possible, the symptoms have existed for a long time, there is difficulty and frequency of micturition with some pain, the urine is turbid, possibly foetid, the patient looks ill and worn-out, and the hypogastric dulness points to the presence of a considerable quantity of residual urine, the case must be regarded as one of considerable gravity. The employment of the catheter for the first time under these conditions is likely to be attended by constitutional disturbances, sometimes of severe character. The examination of such a case had better not be completed in the consulting-room—that is to say, you should defer drawing off the urine till the patient goes home. The examination should be completed in a warm room, so that the patient can go to bed immediately afterwards, where he should remain for two or three days in any case, and for a longer period should constitutional disturbances set in. To relieve the distended bladder and then allow the patient out

in the cold is injudicious surgery. In hospital practice, when the catheter is employed in a case of this kind in the out-patient department, the man should be at once admitted to bed. If the quantity of residual urine be large, only half should be drawn off on first introducing the catheter. The quantity removed should be increased at each subsequent introduction, and the bladder not completely emptied for two or three days, during which the patient should be under close observation. If he be too infirm or nervous to pass the catheter himself, an experienced nurse should be employed for this purpose.

#### Urinary Fever in connection with Catheterism.

In an advanced case of prostatic disease of this kind the urine, even when clear and acid on the first introduction of the catheter, generally becomes clouded and eventually ammoniacal in the course of a few days, and constitutional symptoms supervene. A rigor will probably occur, or even without this the temperature may rise to  $103^{\circ}$  or  $104^{\circ}$  F., profuse perspiration sets in, and, the normal temperature being reached, the fever may not recur. Sometimes more than one attack of this kind occurs, or the fever may be of a continuous character for some days, gradually subsiding; but occasionally the patient sinks into a low typhoid state, with dry, furred tongue, feeble pulse, and great thirst; and if the kidneys are much affected, uræmia, followed by coma, may set in, resulting in a fatal termination. This fever is variously termed 'urinary,' 'urethral,' and 'catheter,' but its exact cause—whether septic or neurotic—it is impossible with our present knowledge definitely to state. Certainly it occurs under the strictest antiseptic precautions and with the utmost skill in passing the catheter. The general treatment of this fever is similar to that following instrumentation or operation for stricture of the urethra, which has already been described,



except that, owing to the advanced age and debility of the patient, it must be more sustaining, stimulants in moderation being allowed. When the urine contains pus, the local treatment will be the same as that presently to be described for cystitis.

### Cystitis.

This, as we have already seen, is a common complication of enlarged prostate, so that we must always be prepared to deal with it in its earliest stage. When the urine has a tendency to become cloudy and gives off a fishy, offensive

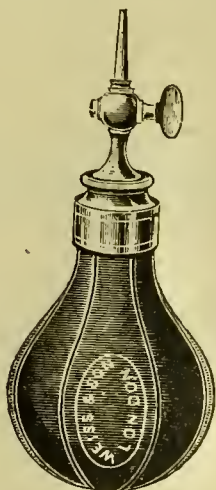


FIG. 36.

odour, the best drug to administer is boric acid, which may be given in 10-grain doses four times daily. A patient of mine, himself a medical man, who for years has been dependent on his catheter, informed me that he found two or three large doses of 25 grains each more effectual in bringing the urine back to its normal condition than repeated small doses; and I have since then frequently verified this experience in practice. If the urine becomes decidedly alkaline, the boric acid should be combined with the benzoate of ammonia in 10-grain doses, or urotropine in doses of from 5 to 10 grains three times



daily may be given. This is particularly effective when the urine contains pus and mucus.

When pus forms, the bladder must be washed out once or twice daily with disinfectants or astringent lotions. A 4-ounce indiarubber bottle fitted with nozzle and stopcock (Fig. 36) is the most convenient apparatus to employ for the purpose. It should be completely filled with the lotion so as to avoid the introduction of air into the bladder. Not more than between 2 or 3 ounces should be thrown into the bladder at one time, though it may be necessary to repeat this process several

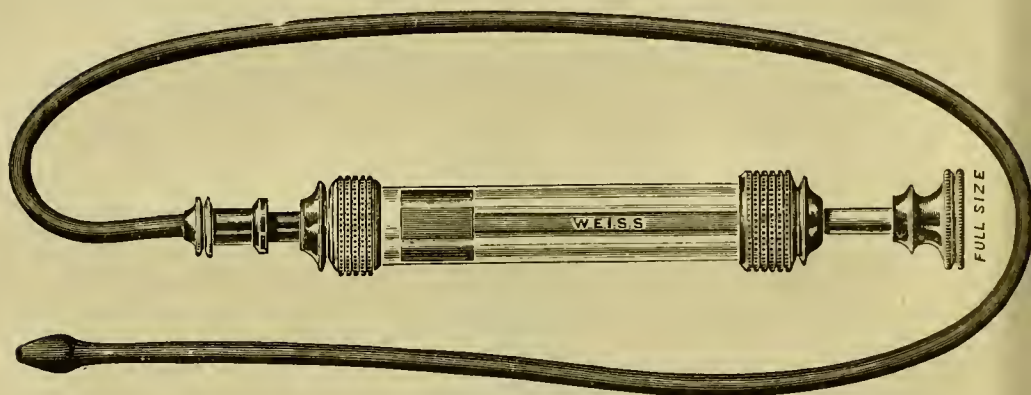


FIG. 37.

times before the fluid returns unaltered. If, however, the cystitis be severe, not more than half an ounce should be introduced, as the bladder walls are under such circumstances extremely intolerant of tension. All lotions should be used warmed to 100° F. For cleansing the bladder the most simple and useful injections are a 1 per cent. solution of boric acid or a teaspoonful of boro-glyceride to 4 ounces of water. Permanganate of potash solution, commencing with 1 in 5,000 and gradually increasing it to 1 in 1,000, and perchloride of mercury, 1 in 10,000, make excellent injections. But our sheet-anchor in such cases is nitrate of silver. Commence with a very weak solution, 1 in 4,000, gradually increasing the strength to 1 in 750. It is rarely that the bladder will

tolerate a stronger solution. I have found solution of resorcin, from 3 to 5 per cent., an excellent injection.

When there is great pain and scalding at the neck of the bladder from local cystitis, there is nothing to equal daily 'installations' of a strong solution of nitrate of silver. The urine is first drawn off and the bladder is washed out with boric lotion. The olivary tip of a Guyon's catheter-syringe (Fig. 37) is then passed just through the membranous portion of the urethra, and a drachm of the solution, gradually increased from 1 to 3 per cent., is slowly injected. This trickles back into the bladder and is allowed to remain there.

### Complete Retention of Urine.

This is liable to occur suddenly at any time in connection with enlarged prostate through congestion and swelling of that organ closing up the already narrowed passage. The congestion may be due to cold, sitting on a wet seat, errors in eating and drinking, sexual excesses, an attack of gout, or injury of the prostate by the catheter. Immediate relief of this retention is imperative—by means of the catheter if possible, otherwise by operative interference. It will be inadvisable to waste time by having recourse to hot baths and opium, as in the case of retention from stricture, for the patient being old and the muscular power of the bladder already impaired, any delay may culminate in complete and permanent atony of the bladder from overstretching of its muscles. To relieve the retention catheters of various kinds are employed. First a vulcanized indiarubber catheter should be used. It is astonishing how retention may occur and still little or no resistance be offered to the entrance of a soft instrument of this kind. If this fail, a coudée catheter and a well-curved one terminating in a coude should be tried in succession. If still unsuccessful, a well-curved cylindrical gum-catheter without a stylet should be employed. This

instrument may be given any curve at pleasure by dipping it in hot water, bending it into the necessary shape, and plunging it into cold water, when it retains its new form. If we fail with this, we employ the same catheter mounted on a stylet. As soon as the end of the instrument reaches the obstruction the stylet is partly withdrawn—a manœuvre which has the effect of causing the end of the catheter to project upwards and forwards, thus frequently entering the bladder. Finally, it may be necessary to employ an ordinary silver catheter or one with a longer curve. The utmost gentleness should be used, force of any kind being avoided, lest a false passage be made or hæmorrhage caused by injury to the prostate. When the middle lobe is the cause of the obstruction and the end of the metal catheter fails to ride over it, the point should be directed right or left with a view to hitting off the channel that exists on either side of its neck. If there be much difficulty in introducing a flexible catheter, it should be tied in for two or three days, but a metal instrument should, as a rule, be withdrawn. If we fail to introduce any kind of catheter, temporary relief may be given by suprapubic aspiration, after which in the course of a few hours a catheter may pass in readily; should this fail, it will be necessary to tap the bladder suprapubically by a trocar and cannula and drain it for a time.

If the retention occurs in an early stage of the enlargement, whilst the expulsive power of the bladder is still unimpaired, it is possible that after the use of the catheter for a few days the bladder may return to its normal state and habitual catheterism be unnecessary. But when the disease is far advanced and the retention has existed for some time, it is rare for the bladder to retain its contractile power, even partially.

An attack of retention is almost invariably followed by constitutional symptoms, so that the patient will have to

remain in bed for several days, and the treatment generally will be the same as that already indicated when habitual catheterism is entered upon.

### The Pre-prostatic Pouch.

In cases of enlarged prostate of long standing we may find that before the bladder is fairly entered a pre-prostatic pouch is encountered—that is, a pouch lying in front of the middle lobe and bounded on either side by the lateral lobes of the prostate, and which may permit the beak of a sound to rotate freely within it. I have not observed any reference to this pouch in the text-books, but its existence is of great importance. I have frequently known it to be mistaken for the true bladder cavity. Composed of the dilated prostatic urethra and that portion of the bladder cavity lying in front of the enlarged middle lobe, it, as a rule, contains urine which is drawn off by the catheter, thus giving rise to the impression that the main cavity of the bladder has been entered. Quite recently I was called in consultation to see a case of this kind in which the medical attendant could only draw off about half an ounce of urine each time he introduced the catheter, but without relief to the patient, though the medical attendant felt sure that the bladder was entered. There was great distension of the bladder, felt above the pubes, which was attributed to blood-clot, as the patient was subject to periodic attacks of hæmorrhage. By means of a well-curved coudée catheter I was enabled to effect an entrance to the main cavity of the bladder and to draw off 3 pints of blood-stained urine, but in doing so I recognised a large pre-prostatic pouch from which the urine had previously been drawn.

A stone may form in this position; I have removed several such calculi, generally by litholapaxy, the cavity being sufficiently large to permit me to work a child's lithotrite in it. I



have also known calculi lying in the main cavity of the bladder missed through the surgeon mistaking this pouch for the bladder proper.

### Hæmorrhage from the Prostate.

Hæmorrhage rarely occurs in the early stages of enlargement of the prostate ; but when the disorder is well advanced this is always liable to take place from various causes. The bleeding may arise from the mucous membrane of the bladder or from the prostate. During the early days after entry on the habitual use of the catheter it is liable to occur from the former source, when there was much distension from residual urine previously, due to rupture of the vessels from their being deprived of their accustomed support. As a rule, the hæmorrhage is trifling, merely discolouring the urine, without the presence of clots, and requires no particular treatment, the symptoms gradually passing off. Then there may be hæmorrhage as the result of congestion of the prostate after exercise or exposure to wet and cold. This is seldom severe, and also passes off with rest. In advanced stages of the disorder there is frequently a varicose condition of the veins on the surface of the prostate, and some hæmorrhage may occur from rupture of these. The bleeding may be so profuse as to distend the bladder. On three occasions I have had to open the bladder suprapubically to turn out an enormous clot filling its cavity. But the most frequent cause of hæmorrhage is injury of the prostate by careless or unskilful use of the catheter, or from difficulty in passing the instrument. As a rule, the blood is mixed with the urine ; but if the injury be in the prostatic urethra or on the anterior surface of an enlarged middle lobe almost blocking the orifice, the blood may flow away quite pure from the urethra.

The treatment consists in perfect rest in bed and the administration of opium. The usual styptic drugs are of



little or no avail. The blood-clots may be allowed to dissolve and come away with the urine. Washing them out through a full-sized catheter with a large eye may be tried, but care should be taken that this does not induce further hæmorrhage. When, owing to difficulty in passing the catheter, bleeding occurs on each introduction, it is better to tie in a good-sized coudée for a few days. If it gets clogged with clot, this may be displaced by gently injecting a little boric lotion from an indiarubber bottle.

Frequent hæmorrhage attended by much pain after exercise in prostatic patients should always give rise to the suspicion of the presence of stone. If a calculus lie in a saccule projecting out from the base of the bladder, there may be intense agony during defecation if constipation exist, and the urine will generally be bloodstained afterwards. I have met with two cases of this kind in practice—one in which the symptoms were completely relieved after the stone was removed suprapubically, and the cause of the other was discovered after death.

Orchitis is not uncommon in connection with enlarged prostate, as a result of catheterism or independently of this; and excessive tenderness of one or both testicles is sometimes found, quite apart from any inflammatory state of the organs. Urethritis and balanitis may occur, particularly in patients suffering from diabetes.

## LECTURE VI.

### THE OPERATIVE TREATMENT OF ENLARGED PROSTATE.

I SHALL now direct your attention to the various recognised surgical procedures employed for the disorder under consideration, which may briefly be classified as follows :

1. *Radical operations*, which aim at removing the obstructing portion of the gland. 2. *Operations undertaken for the purpose of inducing atrophy of the prostate*—(a) castration, and (b) excision of the vasa deferentia. 3. *Palliative operations*—(a) drainage of the bladder through the perineum, and (b) drainage of the bladder above the pubes.

#### Radical Operations.

Numerous procedures have from time to time been devised for the removal of the obstructing portion of the enlarged gland. Many of these are obsolete and have merely a historic interest. I shall only refer to the most important operations—those that are of practical value.

1. Division of the prostatic obstruction by the galvano-cautery.—Bottini was the originator, as he has been the warmest advocate, of this method. An electrode shaped like a Mercier's sound is introduced into the bladder through the urethra. The beak is turned round, and the instrument is withdrawn till it impinges against the obstruction. The current is then turned on, and the obstructing portion of tissue is burnt through. This procedure has not been at all

extensively employed, and at the present time it has few advocates. It is applicable only to a very limited proportion of cases, in which the obstruction is confined to the middle lobe, or to the bar of hypertrophied tissue extending across the floor of the orifice of the urethra, or to the adjacent portion of the trigone. But the chief objection to its employment lies in the fact that the operation is done in the dark, thus rendering it impossible to gauge accurately the extent of destruction done by the cautery.

Wishart and Watson employed the galvano-cautery for the same purpose as Bottini, through a perineal opening into the urethra at the apex of the prostate.

2. Removal of a median growth through a perineal opening into the urethra by means of forceps or instruments constructed to punch out a portion of the growth.—This also is an operation with a very limited range of application. I have from time to time employed this method in suitable cases, and have on two or three occasions removed a pedunculated prostatic outgrowth, either accidentally or by design, when performing perineal lithotomy.

3. Suprapubic prostatectomy.—Though this operation had previously been performed by several surgeons, it is to McGill, who brought it prominently before the profession in this country in 1888 with a series of cases, that it owes its present position. The varieties of prostatic enlargement for which this operation is suitable are (1) enlargements of the middle lobe, whether sessile or pedunculated, projecting into the cavity of the bladder, or forming a bar across the floor of the inner orifice of the urethra; (2) enlargements of one or both lateral lobes, forming prominent tumours in the bladder; and (3) hypertrophied prostatic tissue forming a ring or collar around the inner orifice of the urethra and partially closing it up.

The preliminary stage of this operation, viz., the cystotomy,

is identical with that for the removal of vesical stone or tumour by the suprapubic method. The employment of the rectal bag is a matter of taste. Personally, I have almost completely discarded it as cumbersome and unnecessary, though I habitually used it for some years after its introduction by Petersen. As soon as the bladder is opened the forefinger of the left hand is introduced, and a general survey of its cavity is made. By this means the position, shape, size, and general character of the prostatic outgrowth are ascertained. If the middle lobe be pedunculated, it can be removed either by clipping the pedicle through, flush with the trigone, by means of scissors curved on the flat, or by twisting it off by the aid of forceps. A sessile middle lobe is removed by notching the mucous membrane and sub-mucous tissues on either side of the growth, which is then twisted off by forceps. A prostatic bar or lower portion of hypertrophied collar is similarly removed or cut away by means of Jessop's forceps. A prominent lateral lobe is first grasped by strong catch forceps to render it steady. The mucous membrane at the most projecting part is then snipped by scissors. The opening thus made is enlarged by the finger-nail, and the tip of the finger is introduced. The tumour is enucleated by slowly and carefully separating it from the surrounding tissues. Indeed, in the removal of prostatic enlargements suprapubically the scissors should, as a rule, be merely employed to snip the mucous membrane, the enucleation being accomplished by the finger-point. In this manner hæmorrhage is reduced to a minimum.

Prostatic outgrowths prominently projecting into the bladder consist, as a rule, of more or less distinctly encapsuled tumours covered by the mucous membrane. The hypertrophied collar sometimes assumes a nodulated or beaded aspect, and if the mucous membrane covering it be snipped with scissors these small tumours can be enucleated by the



finger-nail. As a rule the hæmorrhage is not severe, and can be controlled by irrigation with hot boric lotion. If at all profuse the thermo-cautery should be applied to the bleeding-points through a speculum, or the tincture of the perchloride of iron on a sponge. The finger of an assistant placed in the rectum will be of great aid, thus rendering the tumour in the bladder steady and more prominent. Sometimes the enucleation can be best effected by the surgeon introducing one or two fingers of his right hand into the rectum, whilst the finger of the left hand is in the bladder. The drainage of the bladder and after-treatment are the same as after suprapubic cystotomy for stone or tumour.

This is undoubtedly the most valuable of the radical procedures employed for the removal of prostatic outgrowths, that which is most commonly applicable, most easily accomplished, and most thorough in its results. I have performed this operation on several occasions and with considerable success. In one instance I removed both lateral lobes projecting into the bladder, each of the size and shape of half a large pear, the whole weighing 3 ounces. In another there were distinct encapsuled tumours corresponding to the three lobes, weighing 2 ounces, which were enucleated quite readily. Both these operations were thoroughly successful, the patients getting complete control over micturition, which was unattended by any symptoms.

[Shortly after these lectures were delivered another case, very similar to that last referred to, occurred in my practice; and as it is a remarkable one in many respects, I will give details thereof.

J. T., aged sixty-nine, admitted to St. Peter's Hospital November 21, 1900, for cystoscopic examination.

First attended as out-patient in September, 1899. Symptoms: Increased frequency of micturition—every one and a half hours by day and hourly by night; difficulty in starting the stream; dribbling; pain above the pubes before micturition. Both lateral lobes of the prostate much enlarged by the rectum, and soft except that there was a hard nodule in the right



lobe. Residual urine,  $6\frac{1}{2}$  ounces. Directed to use catheter twice daily. Relieved for a time, but symptoms grew worse again.

From the general enlargement felt per rectum and the lobes being comparatively soft, the case was considered one in which, from my own experience and that of my colleagues, vasectomy might be expected to be followed by favourable results. Accordingly, early in January, 1900, double vasectomy was performed, but the results were disappointing. On February 20 the note was: 'No improvement; right lobe hard and painful.' Attended as out-patient off and on; symptoms getting gradually worse. Sounded two or three times with negative results.

Cystoscopy under anæsthetic November 28, 1900. A very large bilobed tumour, with transparent membrane stretched between the lobules, was seen projecting into the bladder. This was diagnosed to be an irregular enlargement of the median lobe, the cystoscope being supposed to have entered beside its pedicle.

On December 1 I performed suprapubic cystotomy. On introducing my finger into the bladder I found that the tumour, which by the cystoscope was regarded as an enlarged bifurcated middle lobe, consisted in reality of the two lateral lobes of the prostate, enormously enlarged, projecting into the bladder, with their adjacent surfaces closely approximated, and a thin band of mucous membrane stretched across between them at their upper aspects. The rubber catheter introduced for distension of the bladder lay on the trigone, the orifice of the urethra being below the tumours.

The most prominent portion of the right lobe was caught by long forceps, and the mucous membrane covering it snipped by scissors. Through this incision the tip of the forefinger of the left hand was introduced, and the tumour (Fig. 38, A) enucleated without difficulty. The left lobe was similarly dealt with, the tumour B being shelled out. The middle lobe was then felt enlarged on the floor. By inserting the finger through the first incision it was hooked round the small tumour C, which was enucleated and removed through this incision, the mucous membrane over it being left intact. During removal of the lateral tumours the tip of the finger passed forwards as far as the triangular ligament. The introduction of an assistant's finger into the rectum steadied and pushed upwards the tumours, and thus facilitated their removal. After removal of these tumours no trace of the prostate could be felt between a finger in the bladder and one in the rectum, the portion of the gland not involved in the tumours having been atrophied by pressure. There was rather free bleeding, but this was arrested by irrigation by hot hazeline solution. No sutures were introduced into the incisions in the mucous membrane. A  $\frac{1}{2}$ -inch drainage tube was inserted and retained in the suprapubic wound for forty-eight hours.

On December 5 a large Jacques's catheter was passed easily through



B

C

A

FIG. 38.—ADENOMATOUS TUMOURS REMOVED FROM PROSTATE. NATURAL SIZE.

A from right; B from left, and C from middle lobe.

the urethra, and the bladder washed by syringing lotion through this and out through the suprapubic wound.

On December 13 the patient passed 12 ounces of urine naturally, and all urine subsequently passed through the urethra. The wound was quite healed on December 21, and urine retained two and a half hours by day and three or four hours at night. His discharge from hospital was delayed, through a sharp attack of gout, till January 23, when he could retain urine four hours. No catheter employed since operation. I had the pleasure of showing the patient, in excellent health, to the class at the Medical Graduates' College on February 27.

The three tumours removed were similar in structure—adenomatous, with distinct fibrous capsules, elastic to the touch rather than doughy. Weight,  $2\frac{1}{4}$  ounces. Fig. 38 represents their actual size.]

Unfortunately, in a few of my cases the bladder did not regain any of its expulsive power even after the obstruction was thoroughly removed, owing to the existence of complete atony of the muscles of the bladder from prolonged obstruction or general sclerosis of the bladder walls. The removal of the growths was, however, followed by subsidence of the most urgent symptoms, and rendered the introduction of the catheter easy.

4. Perineal prostatectomy by Dittel's method.—This operation consists in removing a wedge-shaped portion from the under surface of one or both lateral lobes with a view to relieve the pressure on the urethra. This is accomplished through an incision extending from the median raphé round the sphincter ani to the tip of the coccyx. The ischio-rectal fossa is opened up and by dissection the rectum is separated from the prostate, which is exposed and a wedge-shaped portion is removed from it. By extending the dissection in front a little beyond the middle line the other lobe of the prostate can be exposed and similarly dealt with. An essential feature is that the bladder and urethra be left intact.

This operation does not appear to have been performed in many instances, and the records of cases are not very encouraging, fistulæ remaining in some of them owing to the

urethra or bladder having been opened during the procedure, and imperfect results being obtained in others.

5. Nicoll has modified this operation by performing a preliminary suprapubic cystotomy. This is done for the purpose of introducing a finger into the bladder with a view to pushing the prostatic tumour into the perineal wound, thus facilitating its removal, and at the same time obviating the opening of the mucous membrane of the bladder or urethra.

6. In a communication to the Medical Society of London made in March, 1900, I described, by means of an illustrative case, a new method of performing perineal prostatectomy in which advantage is taken of Dittel's perineal incision; but Nicoll's objects are attained by a much less serious proceeding than suprapubic cystotomy, viz., by a preliminary perineal opening into the urethra.

A gentleman, aged fifty-nine, sent by Dr. Richard Heath, of St. Leonards-on-Sea, consulted me on October 11, 1889, suffering from the following symptoms: Increased frequency of micturition, averaging about ten or eleven times by day and seven or eight times by night; difficulty in starting the stream, necessitating much straining to effect this; he finds that when he places his hand on the hypogastric region and pushes the abdomen upwards the stream starts more readily. Diminished force of the stream. Dribbling at the end of micturition. Sometimes the stream is intermittent. The urine is clear, as a rule; some eight months ago it was very dark in colour, but the patient cannot say if it contained blood. Pain and discomfort behind the glans during micturition, and discomfort above the pubes before the act. The symptoms have existed three years, and have been gradually growing worse. At first they were more troublesome at night, but latterly they have been as bad in the daytime. They are increased by exercise, particularly in walking. I sounded the patient, but could find no stone. There was some difficulty in passing the instrument over the enlarged prostate. Residual urine  $4\frac{1}{2}$  ounces; trace of albumin. Per rectum there was a tumour felt in the right side of the prostate, twice the size of a walnut, very dense throughout, with a nodule of intense hardness, which was very painful on pressure. This nodule felt like a stone embedded in the prostate. The left lobe of the prostate was scarcely enlarged and quite soft. On the 17th I made a cystoscopic



examination, the patient being anæsthetized by Dr. Dudley Buxton, and Mr. Victor Horsley being present in consultation. The right lobe of the prostate was seen to be enlarged and projecting into the bladder, the size of a walnut, irregularly nodulated, and of a dark-brown colour. The left lobe was not visible in the bladder, which, generally, presented a healthy appearance, except that the mucous membrane was trabeculated, the result of constant straining and backward pressure of urine. After consultation exploration of the bladder by a perineal urethrotomy was decided on, and this was carried out next day. The urethra was opened in front of the prostate on a staff. On passing my finger through the opening I found a round, prominent mass, involving the right lobe of the prostate, projecting into the bladder, but no stone could be detected. On inserting the forefinger of my other hand into the rectum the hard nodule was felt as before and the tumour clearly defined, rounded, and intensely hard, the left lobe of the prostate being almost normal. After consultation with Mr. Horsley we determined to remove the tumour perineally. A crescentic incision about 4 inches long was made from the median raphé at the lower end of the urethral wound backwards round the anus to the coccyx on the right side. The dissection was carried deep into the ischio-rectal fossa, the rectum being drawn inwards by a broad retractor. The left forefinger was passed through the urethral wound into the bladder and hooked round the tumour, which was pressed out into the wound, and thus came well into view. The capsule of the prostate was incised and peeled off by means of an elevator. The tumour, which involved the whole of the right lobe of the prostate, was thus removed piecemeal by cutting forceps and curved scissors, only a thin layer being left to support the mucous membrane of the bladder and prostatic urethra, which was left intact. There was very little bleeding, and this was controlled by forcipressure, no vessels being ligatured. On completion of the operation a soft-rubber perineal tube was passed through the urethral opening into the bladder and retained there by a suture, and on this a rubber drainage-tube was fixed to convey the urine to a vessel beneath the bed. The large gaping wound in the ischio-rectal fossa was packed with iodoform gauze and the usual dressings applied. The perineal tube was kept in for six days, during which time the whole of the urine passed through it, not a drop escaping beside the tube, thus obviating any chance of infection of the deep ischio-rectal wound till it had partly filled up and was covered by healthy granulations. The temperature rose to 100° F. one night, after which it did not go above 99° F. After a fortnight the urine began to pass partly through the urethra, and after a few days later no urine passed by the perineal wound in the urethra. The patient was sitting up on December 1. On the 18th he left the surgical home untroubled by any urinary symptom, and he is now quite well. The tumour turned out to be of the fibro-adenomatous type, frequently met with in the prostates of



the aged, the fibrous elements predominating. It was as hard as scirrhus. About its centre a few drops of pus were found in the middle of a small coagulum, due to a thrombus or irritation of a small prostatic concretion found in this vicinity.

The advantages claimed for this method of operating are :

1. The preliminary external urethrotomy permits of the introduction of the finger into the bladder, which, with a finger in the rectum, enables the surgeon to define accurately the shape, density, size, and extent of the prostatic growth in a manner that cannot otherwise be accomplished, except, perhaps, by a suprapubic opening—a much more serious proceeding.

2. The finger can be hooked over the enlarged lateral lobe and the latter pushed well into the ischio-rectal wound, thus to a large extent obviating a deep and dangerous dissection, as in Dittel's operation.

3. With the tumour pushed well into the wound the capsule is easily incised and erased, and the cutting forceps and scissors easily and freely applied, to eradicate the whole mass.

4. The finger in the bladder enables the surgeon to feel when the cutting instruments are approaching that viscus, so that he can remove the whole growth, except a thin layer for the support of the mucous membrane of the bladder and prostatic urethra, without opening the latter, thus avoiding infection of the wound and the existence of a permanent fistula.

5. The stout perineal drainage-tube inserted into the urethral wound carries off all the urine and prevents the perineal wound from becoming septic.

The drawback to the operation is that, like all other operations proposed for the removal of prostatic growths, it is applicable only to certain forms of the disease. It is not, of course, applicable to cases of enlarged middle lobe projecting

into the cavity of the bladder. For such cases McGill's operation is undoubtedly the best. In very fat patients, or when the prostatic tumour is extremely large, it may not be feasible, owing to the fact that the finger may not in such cases be sufficiently long to hook it round the growth.

### Operations undertaken for the Purpose of inducing Atrophy of the Prostate.

1. *Castration*.—The apparent analogy between prostatic overgrowths and uterine fibro-myomata induced Professor J. W. White of Philadelphia to suggest in 1893 that castration might have the same effect in the former disease that removal of the ovaries has in the latter. It has been demonstrated beyond question that castration in young dogs and other animals prevents development of the prostate, and that in fully-grown animals this operation is almost invariably followed by atrophy of the healthy organ. The same is true of the human male. In addition to the conclusive observations on this point on record, I may add that it fell to my lot at one period in India, in the course of my official duties, to examine a large number of eunuchs for medico-legal purposes. Some of these eunuchs had been castrated in infancy; others had voluntarily undergone emasculation through religious fanaticism in early adult life. In one and all of them the prostate was found to be rudimentary.

Castration has now been performed in a considerable number of cases of prostatic enlargement. Unfortunately, the details in a large proportion of the published cases are given in such an imperfect manner that no logical conclusion can be drawn therefrom. There, is, however, a sufficiently large number of carefully recorded cases to show that, without accepting the somewhat optimistic views as to results enunciated by Professor White, in a large proportion of patients the subjects of prostatic enlargement that survive the

operation castration is followed by shrinkage and atrophy of the gland, with corresponding amelioration in the symptoms, as indicated by diminution in the frequency of micturition; relief from the burning pain frequently felt at the neck of the bladder; abatement of the attendant cystitis; improvement in the character of the urine; reduction in the quantity of residual urine; partial or complete return of voluntary micturition; more easy introduction of the catheter; and general improvement in the patient's health. The atrophy of the enlarged prostate is demonstrable by rectal examination, and by the length of the urethra, as indicated by the distance the catheter has to be introduced before urine begins to flow.

One of the most remarkable effects of castration is the decided improvement in the symptoms that sets in in many cases a few hours after the operation, particularly in the diminution of pain, and in the spontaneous passage of urine when all expulsive power had previously been lost. This is obviously not due to atrophy, for the process of wasting requires time—some weeks, in fact—before it displays itself to any marked degree. It must be remembered, however, that the glandular overgrowth is not the only factor, as a rule, contributing to the bulky prostate when the patient comes under observation. There is tumefaction of the organ from congestion and chronic inflammation at the neck of the bladder, and it is to this latter condition that some of the most urgent symptoms are frequently due. Castration has the effect of relieving these urgent symptoms rapidly by diminishing the congestion, thus causing immediate shrinkage of the prostate. How it does so is still a matter of conjecture. Professor White holds that 'the removal of the testicles removes this congestion by abolishing the source of the stimulus that excites the function of the prostate.' Sometimes the immediate improvement in the symptoms continues and becomes more marked later. At others the immediate

benefit disappears after a few days, and marked improvement only sets in after two or three weeks when the atrophy of the gland begins to make progress. In a considerable proportion of cases, castration has no effect in inducing atrophy of the enlarged prostate or in ameliorating the symptoms. I believe it will be found that these are mainly cases in which the prostatic overgrowth has assumed the form of fibroid degeneration.

The most serious drawback to castration for enlarged prostate is the high mortality—a mortality of at least 20 per cent.—by which the operation is attended, owing to the advanced age and, in a large proportion of cases, the broken constitutions of the patients. Mental disturbances, sometimes amounting to mania, occasionally follow this operation. These may be of a temporary character, or mania may permanently remain, the patient, as a rule, succumbing at an early date. It must, however, be remembered that patients with advanced prostatic disease are frequently mentally weak, and that operations of any kind connected with the hypertrophied gland are liable to be followed by insanity. The part played by the anæsthetic in such cases must not be lost sight of. In two cases of mine in which mania supervened on perineal drainage of the bladder for prostatic obstruction, I felt inclined to attribute this to the anæsthetic.

Besides these considerations there is the strong sentimental objection on the part of patients to lose their testicles, even when these organs are no longer of any physiological use. Castration is, indeed, an operation which the surgeon naturally shrinks from suggesting in the early stages of the prostatic disorder, or even whilst the patient is enabled by means of the catheter to lead a fairly comfortable and active life. Nor is it likely that the patient would at all readily fall in with such suggestion. No man will consent to have



his testicles removed for the purpose of preventing future prostatic troubles whilst anything remains of their physiological function, and even when all virile power is lost patients shrink from emasculation through the consciousness of being thereby unsexed. This may be regarded as false sentiment, seeing that the organs are no longer of any use. Call it what you like, it is only human, and has to be reckoned with in practice. A man will only consent, as a rule, to have his testes removed when less drastic measures have failed, and he is driven to it by the agony attendant on the final stages of the disease. When that period is reached castration is in itself an operation attended by a heavy mortality.

These are the considerations that have prevented this operation from being at all freely resorted to, and which have in the last few years induced surgeons to have recourse to vasectomy, which, if not quite so effectual in its results as castration, is practically unattended by danger to life and free from those sentimental objections incident to this latter operation.

2. *Vasectomy*.—This operation consists in division or excision of a portion of the vas deferens. General anæsthesia is, as a rule, advisable; but the operation may be performed with the aid of local anæsthesia, such as the subcutaneous injection of cocaine. The parts having been shaved and rendered aseptic, the vas is searched for in the upper part of the scrotum. It is then firmly grasped between the finger and thumb of the left hand and brought as close to the surface as possible. An incision an inch long is made directly over and along the course of the cord, and the dissection is carried down to the vas, which is recognised by its white, glistening appearance. The vas is then grasped by toothed catch forceps, a blunt hook is passed beneath it, and a loop is withdrawn through the wound after separating it from the enveloping fascia. A



ligature may be tied round the loop, which is cut off, or separate ligatures may be applied an inch or more apart and the intervening portion may be cut away. The skin wound is closed by one or two sutures. The vas on the other side is similarly dealt with, either at once or after an interval of a few days. This latter course is safer and less liable to be followed by mental disturbances.

I have now performed this operation in a considerable number of cases without any mortality. Indeed, I cannot imagine death resulting from such a comparatively simple operation alone. In none of my cases have I noticed any marked atrophy of the testicles, though in a few instances these organs diminished in size and grew softer. There has been no interference with the sexual power when such remained at the time of the operation, beyond the fact, of course, that there was no discharge of semen. In a large proportion of cases there has been decided benefit from the operation, both immediate and remote, similar to those already described as resulting from castration. The atrophy of the prostate progresses much more slowly than after castration, and I do not think that it is ever so complete. In a very considerable proportion of the cases there was no permanent benefit from this operation, though, as a rule, there was temporary subsidence of the more urgent symptoms, due, no doubt, to the influence of the operation in allaying the congestion of the prostate. It is probable that the rest in bed, systematic catheterism, and general régime following the operation had considerable influence in ameliorating the condition of the patients.

Vasectomy effectually prevents the recurrent epididymitis and orchitis, which are such painful and distressing complications in prostatic patients. This happy result would alone entitle this operation to an important place in surgery.

My experience of vasectomy is that it is useless for the

purpose of inducing atrophy of the prostate when that organ has assumed the form of fibroid degeneration as recognised by its hard consistence and nodular form by the rectum. It is in those cases in which the enlargement is mainly or solely of the adenomatous type, the gland being felt generally hypertrophied and soft per rectum, that we may expect permanent results from this operation.

I have never seen a single instance in which, after either castration or vasectomy, voluntary micturition was permanently restored when atony of the bladder had advanced to such a degree that the patient was entirely dependent on his catheter.

Vasectomy is neither so rapid in its results nor so radical a cure as castration. As, however, vasectomy does not interfere with the sexual power and does not involve emasculation, patients consent to its performance at an early stage of the prostatic disease, when it has the best prospect of success, before the degeneration assumes a fibroid character, or irreparable damage is done to the muscles of the bladder.

### Palliative Operations.

When in the advanced stages of prostatic enlargement the capacity of the bladder is much diminished in size, all expulsive power is lost, and severe cystitis exists, it may be necessary to draw off the urine by the catheter every hour, or even more frequently; and when, in addition, there are difficulty, pain, and possibly hæmorrhage in the introduction of the instrument, the condition of the patient is indeed a pitiable one. If something further be not done to relieve his condition, he rapidly gets worn out from the severe pain and loss of sleep incident to the constantly-repeated catheterization. Under such circumstances the bladder must be drained, temporarily or permanently as the case may require, through an opening made either in the perineum or above the pubes,

thus obviating the introduction of the catheter and giving the bladder complete rest. The method of draining the bladder by the perineum was described in a previous lecture in connection with stricture of the urethra. Should it be considered advisable to establish permanent drainage by this route, this can best be effected by the apparatus designed by Annandale for this purpose (Fig. 39).

To effect drainage of the bladder above the pubes the operation is the same as suprapubic cystotomy for stone. Drainage

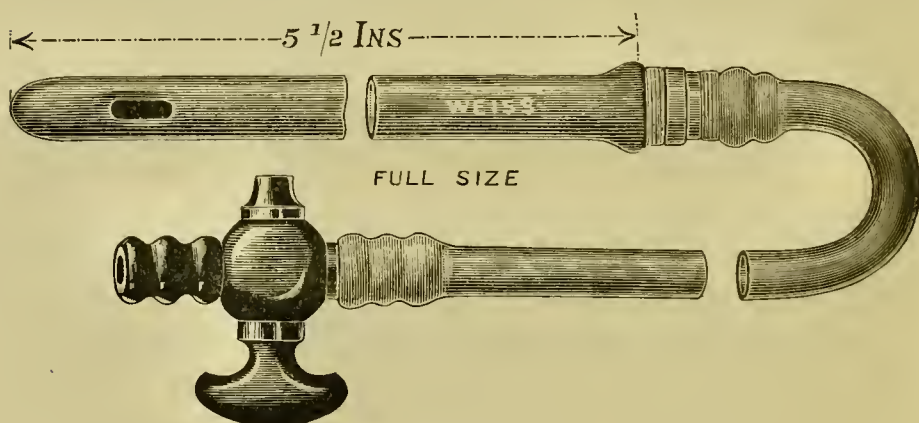


FIG. 39.

by this route may be permanently carried out by an apparatus devised by Thompson (Fig. 40), by which a soft rubber catheter is retained in the fistulous opening by means of a silver plate held in position by a belt round the waist and a perineal band. The other end of the catheter passes into a rubber urinal strapped on to the leg.

The considerations that must guide us in our choice between these two operations may be stated thus: The perineal is a much less serious operation than the suprapubic. When, therefore, drainage alone is required, and this is to be of a temporary character, and particularly if the patient be very feeble, the former operation should be selected. But if the drainage is to be permanent, if there be suspicion of the

presence of calculus, or when, from previous observation by the cystoscope or otherwise, it is known or suspected that an outgrowth of the prostate causing or accentuating the obstruction exists, which is capable of being removed, suprapubic cystotomy should be employed. By this procedure the bladder

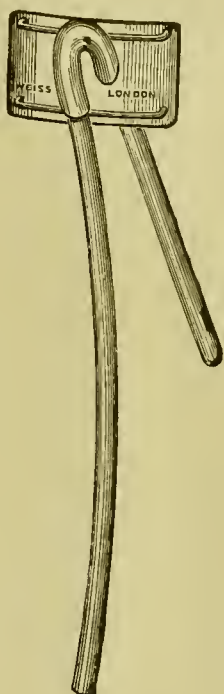


FIG. 40.

at the same time that it is drained can be thoroughly explored and a stone or prostatic outgrowth can be removed. Thick, dense flakes of muco-pus and phosphatic grit, which in cases of this kind frequently adhere to the walls of the bladder, can be scraped off by the finger-nail or scoop and removed by irrigation.











